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THE Chemical Age

VOL. LXXII 7 MAY 1955 No. 1869

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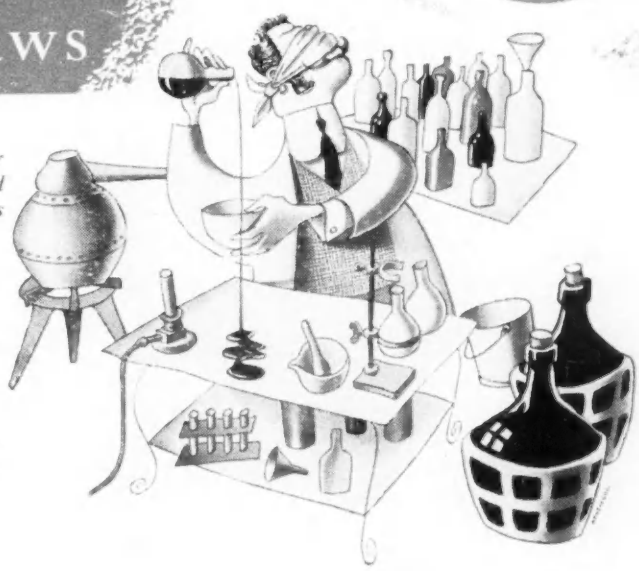
B. P. L.

. . . the unerring laws

"Chemical science during the last quarter of a century has made such extended progress that our arts and manufactures assume altogether a different aspect. Those chemical arts which formerly were rudely conducted by the system termed 'the rule of thumb' are now methodically organised and arranged in accordance with the unerring laws of chemistry . . . Hence, not only are more accurate and uniform results obtained, but success and economy take the place of failure and waste." (*Chemical News*, 1859, **1**, 1).



Here, in the first number of 'Chemical News,' published nearly a hundred years ago, the eventual development of scientific control of the methods and means of production is welcomed perhaps a little prematurely; but in thousands of industrial laboratories to-day 'the unerring laws of chemistry', and B.D.H. reagents, enable the conduct of the chemical arts to be successful and economical . . . and as civil as you please.

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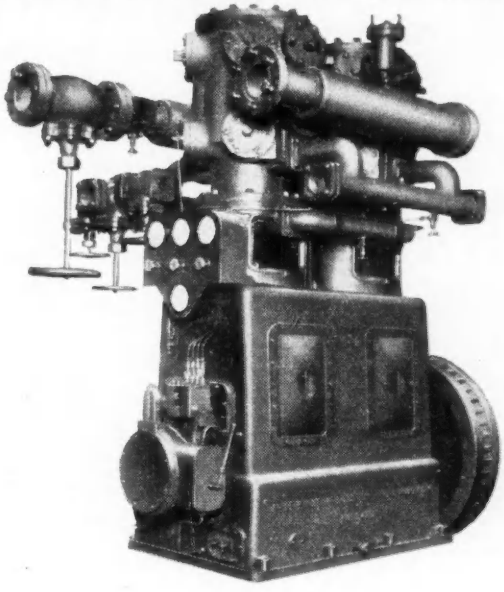

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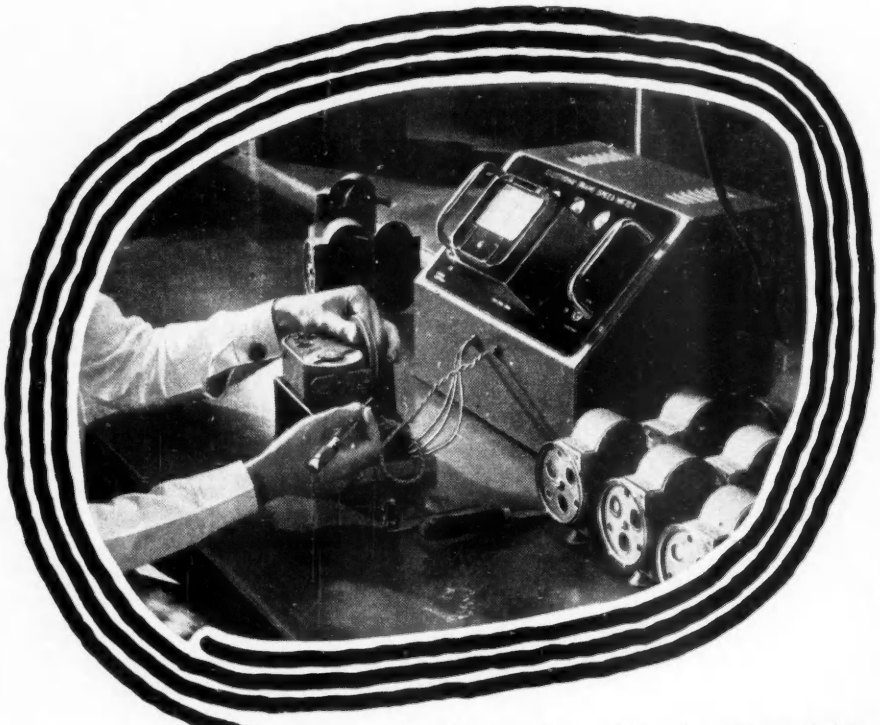

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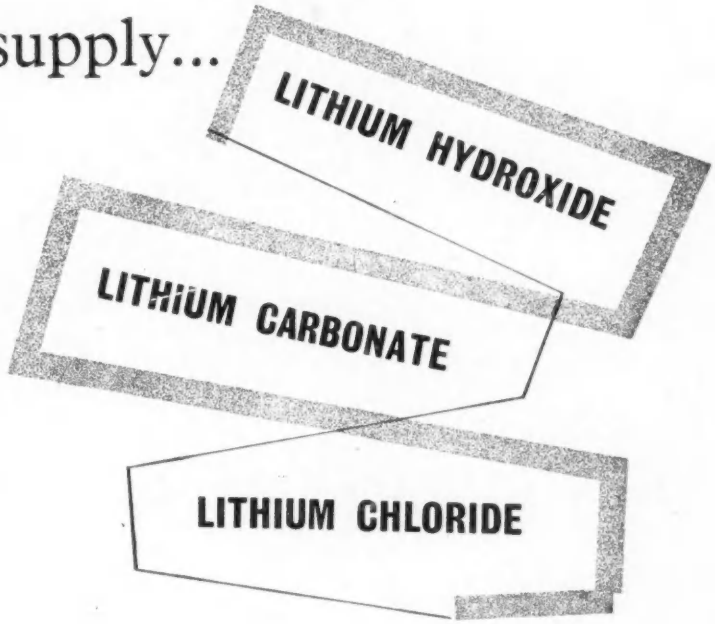

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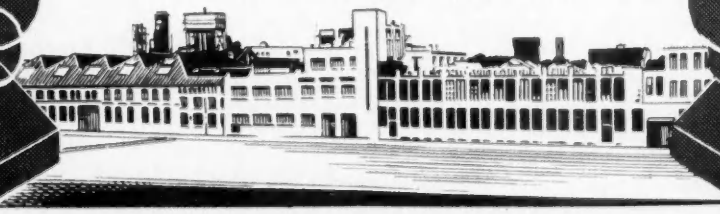

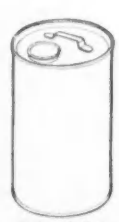

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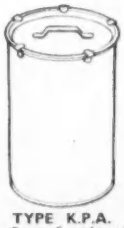

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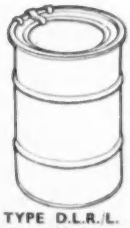

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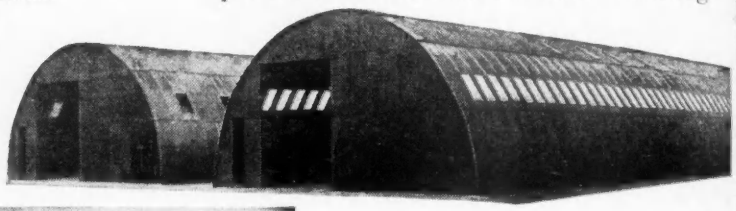
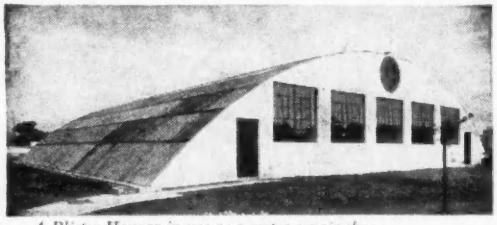


Two Romney huts in use at an Engineering Works



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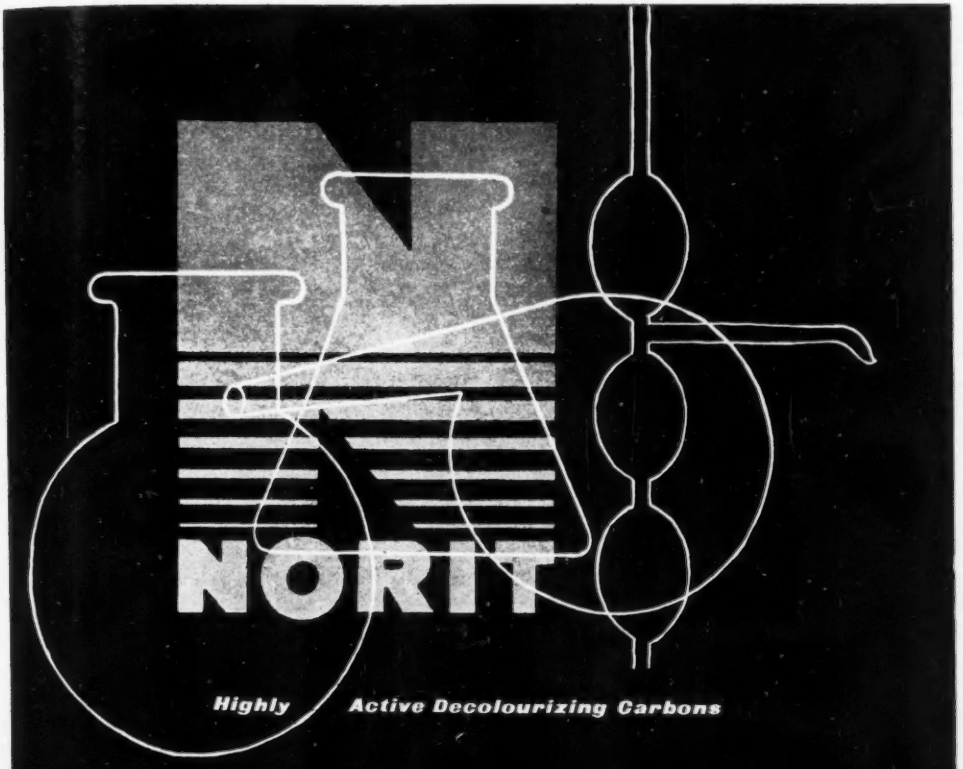

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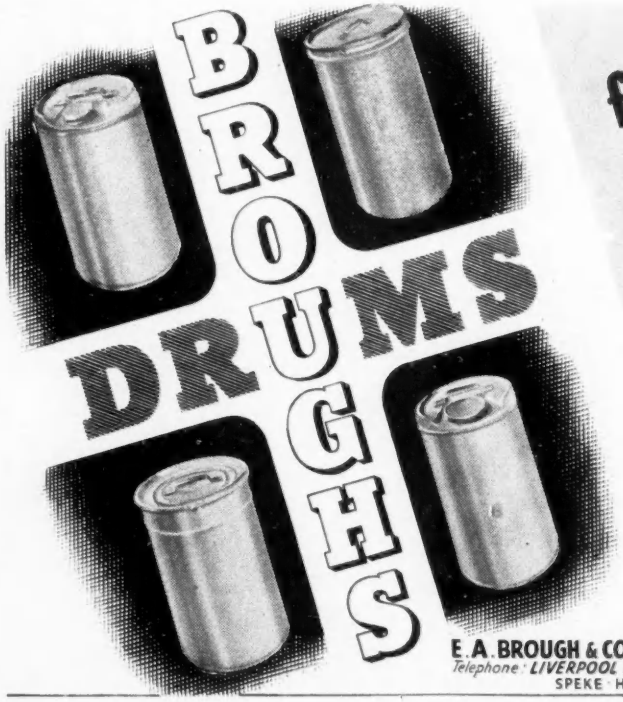

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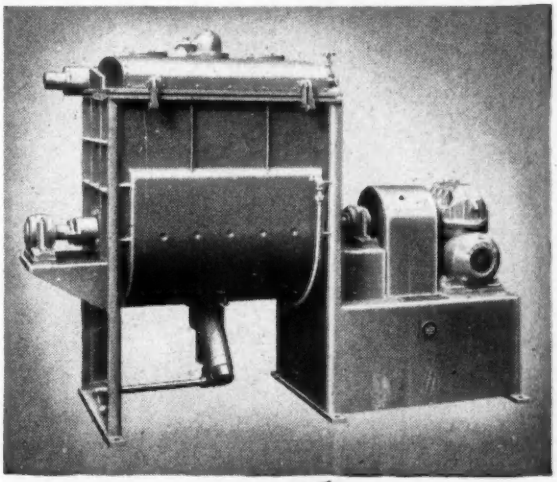
Below is illustrated the characteristic "Simplex" blade design.



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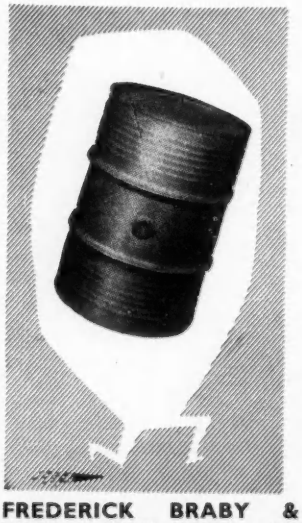

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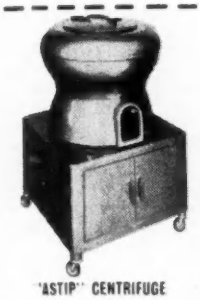

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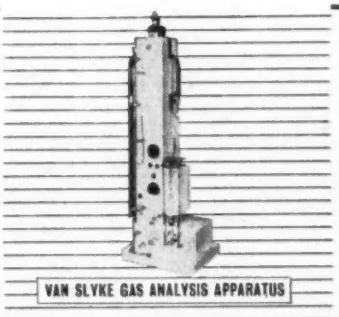

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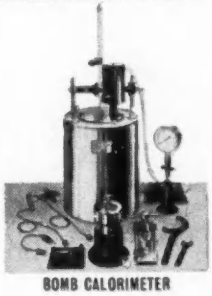

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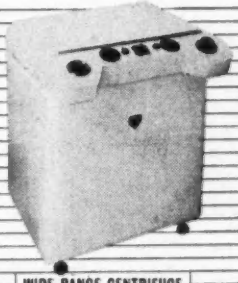

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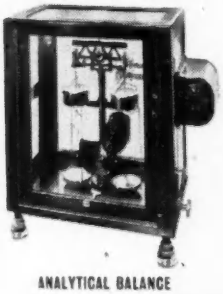

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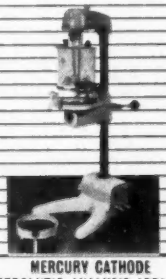

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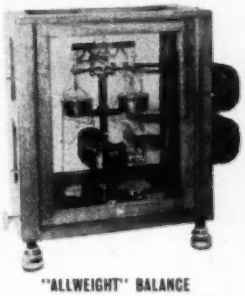
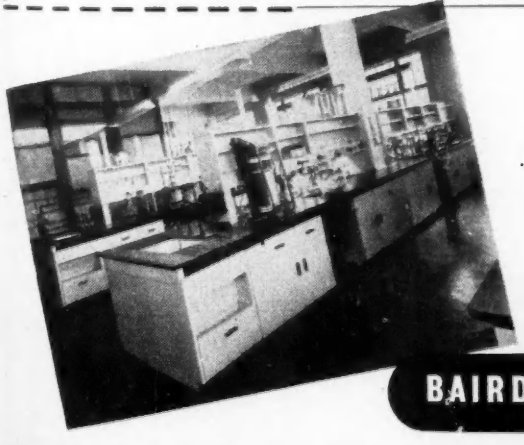


"ALLWEIGHT" BALANCE



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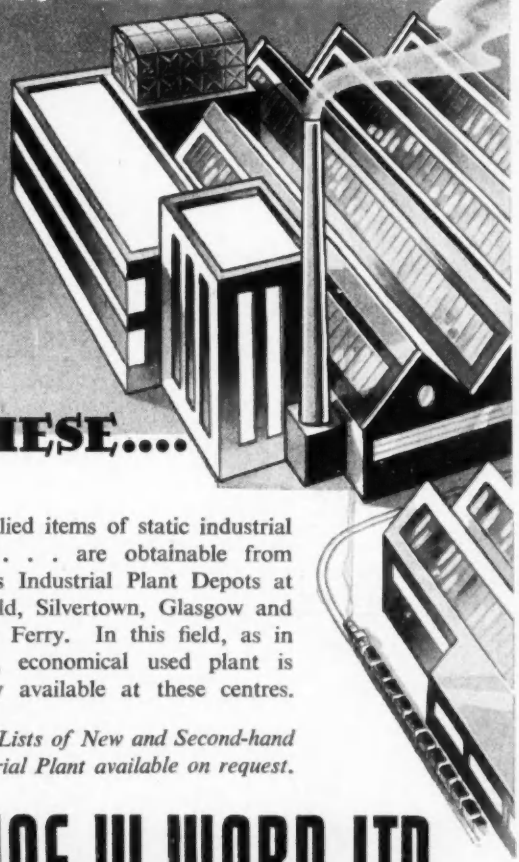

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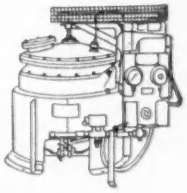

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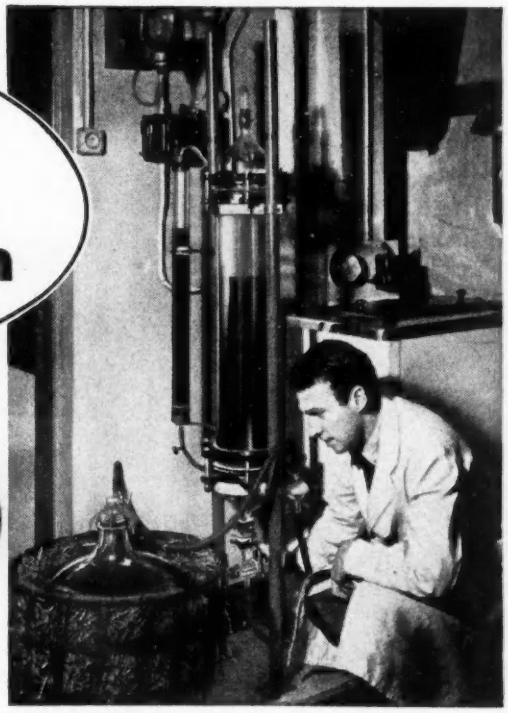

"Stilbazo" represents another flight of the chemist's fancy in the realms of abbreviated nomenclature. It stands for *di*-Ammonium stilbene-4 : 4′-*bis*-(1-azo-3 : 4-dihydroxybenzene)-2 : 2′-disulphonate. It can be identified also with equal brevity as H & W Code 9275.7 and is yet another reagent for aluminium.

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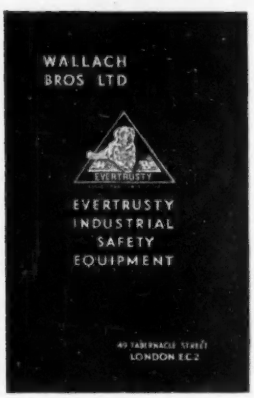

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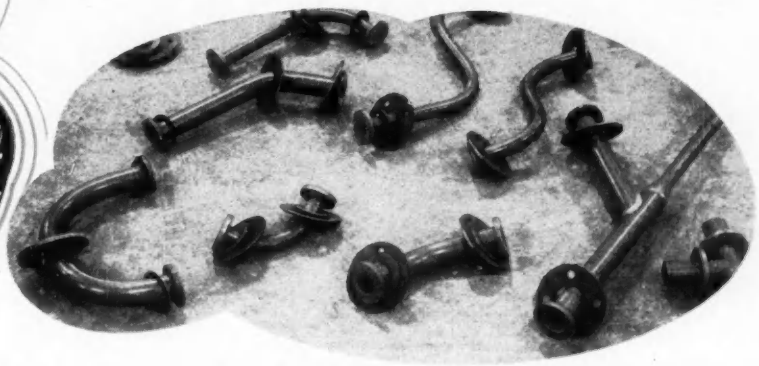

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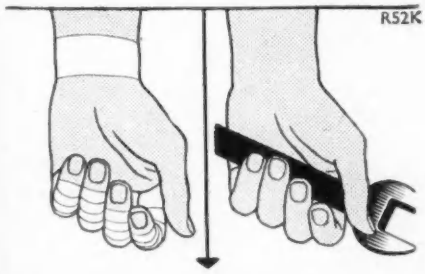

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The CRL Report

THE main DSIR Report (1953/54) that appeared earlier this year (see THE CHEMICAL AGE, 1955, **72,** 721) seemed to give the Chemical Research Laboratory the somewhat 'taken-for-granted' position of an old retainer. The CRL was not among the establishments of DSIR to receive a priority share of the newly increased allocation of funds, either for building or staff expansions. As the DSIR Report observed, 'such a decision necessarily meant that only relatively trifling additions of staff, or none at all, could be authorised at that stage for the remaining establishments . . .' Possibly we are chemically biased, but we found it a little surprising that the CRL should take a place among the 'also-rans'.

Now that the fuller and separate annual CRL report has appeared ('Chemistry Research, 1954,' 1955, 72 pp., HMSO, 3s.), it can certainly be noted that needs for space and staff augmentation cannot be deferred for much longer. The leader of a team for chemical engineering research has already been appointed and this new section of investigation will be in active operation by 1956. 'A need for open floor space for larger scale operations will arise within the next few years'. In view of the long delays that all DSIR building projects have suffered in the past ten years, it seems something of a long-odds speculation to start chemical engineering research before floor-space on the scale that is essential is at least in the process of being constructed. It must certainly be hoped that the deficiency is not expected to display critical symptoms before relief is approved and belatedly provided. Chemical engineering research is given the right-sized shoes to fit its feet in the United States and in Germany; we cannot put aside the suspicion that here it may have to limp along.

The new CRL report places strong emphasis upon the need to recruit more staff. Industry is steadily increasing its demand for CRL services. This is particularly demonstrated in such special services as the provision of pure, standard organic compounds, pure metals, and cultures of industrial bacteria. But 'the staff engaged in the maintenance and improvement of these special services reduces the man-power available for the general research programme. It is our view that it is important to ensure that adequate staff should be provided for the Laboratory to carry out both these activities'. There can be little disagreement with that.

Nevertheless, it may well have been right for certain other establishments to be the first in the DSIR queue. The Mechanical Engineering Research Laboratory, the Hydraulics Research Station, the Water Pollution Research Laboratory,

the NPL, the Radio Research Station, and the Fuel Research Station have all been given priority of preference for the first benefits from the DSIR's increased housekeeping allowance. With so much essential and long-promised post-war expansion held up year after year, the Department cannot be expected to attempt to repair every neglect simultaneously. Our comments are not intended critically, but simply to underline the fact that the Chemical Research Laboratory is still standing in the queue. No doubt we shall learn more about the CRL's 'turn' for priority in next year's reports.

Selecting research items from the many that are described in the report must be something of a lucky dip operation. Perhaps one of the most potent contributions of the Laboratory is its general study of metallic corrosion, in which the stress is rightly laid upon fundamental research. Here again there are indications that staff shortage limits progress. The time of the Corrosion of Metals Group is increasingly occupied with advisory duties and 'extra-mural *ad hoc* problems.' After 17 years of leading this Group's research, Dr. W. H. J. Vernon has retired; and this year he will receive the Willis Rodney Whitney Award from the National Association of Corrosion Engineers in America, a world tribute both to the man and his CRL career. The economic importance of corrosion research could hardly be more vividly revealed than by reading the account of this Group's advisory services (pp. 7-9). Corrosion has a diversity of cause and circumstance; its recognition still seems much easier than its prevention. The CRL discovery of chlorophyll's tarnish-inhibiting properties has already been mentioned (see THE CHEMICAL AGE, 1955, **72,** 313), but it might be said now that a substantial number of other substances were also shown to be promising anti-tarnish impregnants in the same piece of research—chromates, tannins, cyclohexylamine, etc. Earlier reportage has tended to give chlorophyll most of the limelight, an indication that for chemical substances, as well as for people, controversy creates publicity. It is worth noting that anti-corrosion advice given by the CRL to a British subsidiary of a US firm was applied so successfully here that the same course of remedial action was swiftly adopted in the US factory as well!

The recovery of selenium from pyrites flash roaster sludges (formed in the acid washing of the SO_2) has been impressively advanced since its first possibilities were mentioned in last year's report. Some sludges have been found to contain as much as 60 per cent of selenium. Two methods for recovery are outlined —by sublimation or by treatment with sodium cyanide. The practical suggestion is made that selenium-rich grades of pyrites should be selectively sent to installations where sludges are regularly produced. Another contribution of special novelty has come from the Organic Group and may well have a profound bearing upon the future of analgesic drugs (see THE CHEMICAL AGE, 1955, **72,** 387). Examination of the brown dust by-product formed in the sublimation of commercial salicyclic acid showed that 80 to 82 per cent was composed of 4-hydroxyisophthalic acid. The similarity of this substance's structure to that of salicyclic acid prompted pharmacological investigations. Preliminary results have indicated that the substance is more effective and less toxic than aspirin, and only 10 per cent as toxic as codeine. Those who from time to time try to correlate the costs and profits of research might take note of this example—the results of research can never be predicted in nature or value.

Cerium, molybdenum, and tungsten have been added to the Laboratory's stock of pure metals (which now numbers 29); the list of high purity organic compounds now includes 44 materials, and nearly twice as many samples were despatched as in 1953; the collection of industrial bacteria maintains 750 strains, 80 of them new additions during 1954, and 895 cultures were supplied last year, 279 of these being sent overseas.

Excluding attached guest-workers the staff of the CRL during 1954 numbered slightly under 120. The country, and particularly its chemistry, would seem to be getting extraordinarily good value for its money!

Notes & Comments

Acid Test Case

A RECENT High Court decision has been discussed in the April issue of *The British Manufacturer*. A company which had ceased to occupy premises for manufacturing in 1951 was sued for damages to a child of 10 because in 1952, when trespassing on the disused site, this child was burnt by a partly-filled phial of sulphuric acid thrown against a wall by another child. Judgment was given in favour of the company. The fact that the company had taken special precautions to discourage trespassers undoubtedly counted with considerable weight. Had the site been left fairly unprotected, the charge of negligence with 'dangerous chattels' might well have been upheld. The plaintiff's case was based upon the argument that the company should have foreseen the likely trespassing of children. The fact that an 'elaborate wire entanglement' had been erected on top of a low wall between the disused premises and a neighbouring forecourt was powerful evidence for the defence. In this particular case it appears that the phials of acid came from disused fire extinguishers and that the phial causing the trouble was an overlooked exception from a previous clearing-up of the disused premises. The risk that dangerous substances or goods may be left on empty premises is far greater for chemical manufacturers. The moral of this High Court decision is obvious enough—when manufacturing or warehouse premises are abandoned, they must be well protected against trespassing in order to show that any person who may suffer damage is in fact an unlawful intruder.

Man-Power

THERE have been several suggestions in the Press recently that science graduates who take teaching posts will obtain military service deferment. If these reports foreshadow official action, a practical move towards easing one of the country's most dangerous man-power crises is in the making. It is to be hoped that an uninformed and popular reaction does not upset its prospects of introduction. The fairly immediate benefit is likely to be an annual addition of up to 400 science teachers. The longer-term effect is bound to be a substantial increase, perhaps in thousands rather than hundreds, of trained scientists. For against the current background of dire shortage, every additional science teacher must 'create' many times his own number of science students. Selectivity in the responsibilities of public duty is often objected to, but today when a young man chooses science teaching for his career he is in effect volunteering for a lifetime's public service.

Postgraduate Courses

ANOTHER contemporary turn in the scientific man-power situation has been indicated in the 1954 Annual Report of FBI, whose Industrial Research Committee has examined 'the industrial value of the postgraduate course leading to the Ph.D. or D.Phil. degree'. This has been prompted by the large post-war increase in the number of science graduates undertaking post-graduate work before leaving universities. It is stated that a poll of opinion among research directors indicated 'a certain uneasiness about the Ph.D. course'. This matter seems likely to be pursued by FBI in a critical mood. This is another timely development. Although it is probably unfair to generalise, much of the work that for many years has been sealed with awards of Ph.D. degrees has been ultra-academic. Should a degree that is so much sought after continue to lean so heavily in the direction of ivory towers? Any action that helps to emphasise the equivalent value of applied science, whose problems make no lesser demands upon objectivity and the true research outlook, will bring about a better balance. The purist nature of Ph.D. theses is far too long-established for the universities to fear an over-dilution of applied studies; and it is surely time that the technical needs of the country were allowed some concessions.

BAC Hits at Wage Freeze

FBI Recommendation Condemned

THE Council of the British Association of Chemists, at a meeting recently, considered a recommendation by the FBI to its members that the salaries of scientists in industry should not be raised in competition with increases in the remuneration of science teachers. It was felt that this was a most regrettable suggestion and that it was still more to be regretted that the Minister of Education had supported it publicly.

Council felt that the recommendation was to be condemned most severely on the following main grounds: it was likely to defeat its own object in that, if the remuneration of scientists was to be arbitrarily restricted in this manner, the flow of new entrants was likely to be decreased rather than increased. In this connection it is worth noting that the remuneration of scientists generally, upon whom so much seems to depend, is even now at a lower level than in administration and in other professions; it is obviously highly inequitable that, in effect, the cost of producing new scientists for the benefit of the community as a whole, should be imposed upon a small section of it. This cost should be met from general taxation; a most disturbing feature was that there appeared to have been no attempt to discuss the matter with those Associations whose function it is to protect the economic interests of scientists.

The Council of the British Association of Chemists hopes most sincerely, that for the peace of mind of all concerned, this recommendation will be withdrawn and that the Government will not continue to support it.

In a letter to THE CHEMICAL AGE the General Secretary of the BAC, Mr. G. R. Langdale, says that the FBI proposal has engendered 'what can only be described as a state of alarm and despondency among chemists.'

'We must confess that we cannot agree that the best way of recruiting more scientists, of which it is generally agreed there is a dangerous shortage, is to restrict their salaries,' the letter continues. 'One would have expected that, from the point of view of ordinary common sense, the offering of greater rewards to those already engaged in the industry and such remuneration as would attract the best type of recruit to the teaching services, would be more effective.

'If it were not for the fact that the well-being of the country is so vitally affected, the present position might well be described as "Gilbertian." It must be borne in mind that it takes time to produce a science graduate and a period of several years already separates us from any possibility of the supply of scientist becoming adequate.'

Wages Increased

Wages of 113,000 workers in the chemical and allied trades increased between January and March this year. The estimated total amount of the increase was £47,400 a week. Rises were granted to workers in heavy chemicals and fertilisers manufacture and building trade craftsmen and engineers in certain sections of the industry.

The bottling department at the liquid methane plant at Fiorenzuola D'Arda, Italy. Methane is distributed throughout Italy by a pipeline 2,108 miles long from what is said to be Europe's richest source of natural gas

Essential Oils

Development of Commonwealth Resources

SPEAKING at The Royal Society of Arts, Commonwealth Section, on Thursday, 28 April, Mr. M. F. Carroll, M.Sc., F.R.I.C., discussed 'The Commonwealth as a Source of Essential Oils.'

The essential oils are the volatile and oderiferous constituents of plants and may be obtained from the seeds, flowers, leaves, roots, or the wood itself by steam distillation. Their value lies largely in their intense odours and flavours, and in these properties they cover almost the entire range of man's olfactory experience.

The chemistry of the essential oils has been the subject of much fundamental and applied research over the past 100 years. Most of the constituents are now known and nearly all the important ones have been synthesised. Quite a number are now produced synthetically.

The processes used for the production of the oils are necessarily simple as the producers are often peasant farmers with little technical knowledge. Steam distillation is the most common process; expression is used for the better class citrus oils; while the most delicate oils, such as jasmin, may be obtained by fat or solvent extraction.

It is difficult to determine the total world production of essential oils but a reasonable estimate would be of the order of £100,000,000, of which the Commonwealth contributes about £4,000,000. This sum is divided up between the various Commonwealth countries approximately as shown in the table below.

Country	*Value*	*Principal Oils*
Australia	£500,000	Eucalyptus, citrus.
India	£1,500,000	Lemongrass, sandalwood, palmarosa, citronella.
Ceylon	£800,000	Citronella.
British West Indies	£300,000	Citrus, bay, pimento.
British East Africa	£100,000	Geranium, cedarwood, citrus, lemongrass.
Zanzibar	£100,000	Cloves.
Seychelles	£100,000	Cinnamon leaf, patchouli.

Canada, South Africa and New Zealand make no significant contribution.

The speaker went on to say that more than a thousand essential oils had been described, but of these only about 100 were produced commercially. He gave a brief review of some of these with the purpose of putting Commonwealth production in its true perspective.

Turpentine, he said, was the most important essential oil, but unfortunately, apart from India, no Commonwealth source was available. Peppermint oil was obtained from two plants, *mentha piperita* in America and Europe, and *mentha arvensis*, mainly grown in Japan, China and Brazil. The citrus oils were mainly produced in the US, British West Indies, Italy, French North and West Africa, and Israel. Before the war camphor oil was almost entirely a Japanese monopoly. Lavender oil was produced mainly in France and was used almost entirely as a constituent of perfumes. India and Guatemala were the chief producers of lemongrass oil, while rose and jasmin, the most costly of the essential oils, were produced largely in France and Bulgaria. The Commonwealth produced large quantities of sandalwood oil.

Chemical Conversion

Mr. Carroll continued by giving an account of some of the processes used in the production of 'isolates' or pure oils. It was, he said, often profitable to transform an isolate from one oil and convert it by a chemical process into some quite dissimilar oil. For example, menthol can be prepared from Java type citronella oil, and citral could be converted into the ionones and methyl ionones which were used as the basis of violet and orris perfumes.

The factors affecting production were the next subject to be discussed by the speaker. Oderiferous plants were to be found in all parts of the world, he said, but it might be expected that the tropics would be most suitable for essential oil production. Nevertheless the north temperate zone produces at least two thirds of the total value, most of the plants being natives of this zone. In suitable conditions, however, they could be grown in the tropics, the highlands of Kenya being an example. Climate was not such an important factor in the production of essential oils in the Commonwealth.

The cost of essential oils, especially the more expensive ones, was almost entirely a labour cost, and certain parts of the Commonwealth with a high standard of living

had difficulty in competing. India, Ceylon and Pakistan, where labour costs were still low were, however, capable of competing in world markets.

Transport was another factor that had to be taken into account, the speaker said. Seeds, which gave a high yield, could be transported without difficulty, but in other cases it was often more convenient to take the still to the site where the plants were grown.

Difficulties arose, he said, when attempts were made to develop the essential oil industry in new districts as conditions were always different, and knowledge obtained from the country of origin was often both useless and misleading. In these cases scientific investigation was essential.

Future of the Industry

Discussing the future of the essential oil industry in the Commonwealth, the speaker said that factors tending to increase prices and so favour production were the increasing standard of living throughout the world, resulting in a higher demand, and the higher labour cost resulting therefrom. The increasing tendency to synthesise the important constituents of the essential oils would, however, have an adverse effect. Another factor was the growing demand for land for food production instead of for less important products.

Mr. Carroll concluded by giving an account of some of the work that was being done to advance the essential oils industry in the Commonwealth. He said that in the realm of pure science the Commonwealth had a worthy position. Much work on the chemistry of the essential oils had been done in the UK, in India and in Australia. The main emphasis should now be on the cultivation and acclimatisation of plants not indigenous to the Commonwealth, but of economic importance—not what is available but what the public wants. Technological process was slow and the first necessity was adequate planning to reduce labour charges which were the major cost. Attention would also have to be paid to the provision of better distillation plant and also to proper storage. Where new ventures were to be undertaken, more supervision by experienced technologists was required. There were several examples of failures due to inexperience. The oil produced could only be sold at low prices and a prejudice was created in the mind of the buyer, which persisted even when the mistake had been rectified.

We were, at present, a long way behind the rest of the world, but there was no reason why we should not take the lead by developing what we had. We could develop perfumes based on plants indigenous to the Commonwealth, or we could utilise little-known essential oils of the Commonwealth in chemical industries. Thus oelanthus oil, produced in South Rhodesia, is probably the best source of pure geraniol.

The greatest contribution to the development of the essential oil and related industries would have to come from commercial interests. There were many firms operating in the major countries of the Commonwealth which relied on oils and isolates from their own factories in the UK. As trade developed there would be a tendency for them eventually to collect and distil their own material. Asian countries might be expected to consume their own produce as their manufacturing experience and standard of living increased.

An example of what had been done in one colony was then given by the speaker. Training in England was given to a European manager and proper distillation plant was built. The project was successful from the start and had contributed substantially to the colony's exports. Considerable progress had also been made in the British West Indies where the citrus industry had developed rapidly.

Texas Plant

ANOTHER stage in the programme of expansion planned by Acheson Industries Inc. was completed recently when a new plant at Orange, Texas, was opened.

The plant will produce concentrated dispersions of carbon black in thermoplastics. These concentrates will be further processed by manufacturers and marketed in the form of granules for moulding, melt spinning or as a finished product, e.g. polyethylene seamless tubing. The carbon black dispersions will be used primarily to prevent the deterioration of exposed polyethylene-sheathed cables and pipes. It has been estimated that the presence of a carbon black dispersion will lengthen the life of exposed polyethylene from rather less than one year to over 20 years.

The Export Situation

Increased Business During March

EXPORT business in March showed a welcome increase over the February figures, but this was partly due to the longer month. The total for chemicals of £20,790,496 compares favourably with the previous month's £18,587,192 and even more so with the figure of £17,321,202 for March last year.

The increase was fairly general, with one or two commodities showing slight falls, but the majority improving. The progress of dyestuffs intermediates has been impressive and ethyl, methyl, etc., alcohols have recovered well. Synthetic dyestuffs, fertilisers and disinfectants (including sheep and cattle dips) decreased, but plastics materials, coal tar products and pharmaceutical products advanced well.

Destinations for exports showed little variation during the month. West Germany's increased imports of chemicals from Britain are significant in view of that country's own expanding industry. Pakistan seems to be becoming an important customer again after a considerable decline in business, and exports to the US were good.

TABLE 2

VALUE OF EXPORTS IN £ : PRINCIPAL CUSTOMERS

	Mar. 1955	Feb. 1955	Mar. 1954
Gold Coast	323,567	398,808	376,723
Nigeria	396,922	358,513	348,472
South Africa	986,856	821,727	936,020
India	1,862,418	1,272,812	1,563,403
Pakistan	368,042	140,008	405,990
Singapore	368,753	290,417	360,187
Malaya	294,748	201,101	297,126
Hong Kong	336,758	281,464	367,383
Australia	1,715,034	1,689,281	900,390
New Zealand	661,047	531,169	516,401
Canada	441,187	483,297	458,114
Eire	599,092	537,797	604,910
Finland	264,466	235,927	201,920
Sweden	527,926	478,486	630,058
Norway	288,364	350,089	241,111
Denmark	320,823	291,731	380,813
Western Germany	527,695	425,205	287,227
Netherlands	617,073	571,988	661,901
Belgium	459,249	453,340	363,455
France	763,164	619,713	506,553
Switzerland	268,005	233,539	234,997
Italy	412,637	519,288	520,896
Egypt	343,955	391,503	335,961
US	699,039	525,400	667,418
Argentine	597,070	666,390	398,528
Total value of chemical exports	**20,790,496**	**18,587,192**	**17,321,202**

TABLE 1

VALUE OF EXPORTS IN £ : PRINCIPAL COMMODITIES

	Mar. 1955	Feb. 1955	Mar. 1954
Acids, inorganic	58,387	59,861	51,662
Copper sulphate	415,908	442,320	498,264
Sodium hydroxide	416,967	477,320	436,260
Sodium carbonate	277,410	296,917	184,274
Aluminium oxide	43,254	115,837	12,863
Aluminium sulphate	35,220	35,553	29,726
Ammonia	32,179	26,938	37,459
Bismuth compounds	35,689	23,392	33,986
Bleaching powder	58,354	41,317	36,061
Hydrosulphite	84,133	75,736	56,455
Calcium compounds, inorganic	30,833	65,810	26,430
Lead compounds, inorganic	31,668	24,727	40,751
Magnesium compounds	53,811	58,178	49,662
Nickel salts	78,106	52,173	53,534
Potassium compounds	48,609	36,228	31,780
Acids, organic and derivatives	56,044	70,547	58,118
Ethyl, methyl, etc., alcohols	165,441	90,382	157,966
Acetone	22,941	73,996	77,257
Citric acid	34,030	27,998	24,925
Sulphonamides, unprep.	129,367	101,409	75,782
Dyestuffs intermediates	151,356	147,494	86,269
Total for elements & compounds	**4,762,466**	**4,694,509**	**4,734,840**
Coal tar	82,977	69,601	134,915
Cresylic acid	79,176	62,241	43,670
Creosote oil	165,045	58,171	155,743
Total for tar products	**401,225**	**250,359**	**360,082**
Indigo, synthetic	43,672	42,694	85,605
Total for synthetic dyestuffs	**855,361**	**875,759**	**830,127**
Total for paints, pigments & tannins	**1,752,875**	**1,641,488**	**1,612,533**
Medicinal and pharmaceutical products, total	**3,043,051**	**2,764,464**	**2,847,501**
Essential oils :			
Natural	57,805	40,775	42,341
Synthetic	142,049	66,847	96,847
Flavouring essences	114,177	78,703	96,339
Total for essential oils, perfumes, etc.	**2,028,370**	**1,879,841**	**2,003,239**
Ammonium nitrate	18,867	3,969	269
Ammonium sulphate	180,755	244,579	232,203
Total for all fertilisers	**258,899**	**284,872**	**284,754**
Plastics materials, total	**2,052,348**	**1,741,814**	**1,801,350**
Disinfectants, etc.	69,108	242,437	85,404
Insecticides & fungicides	379,775	273,708	312,900
Rodenticides & weedkillers	157,777	83,971	73,971
Lead tetraethyl	1,303,800	960,615	219,754

British Aluminium

Sixty Years' Progress

ELECTROLYTIC methods for the extraction of aluminium were only in their infancy when the British Aluminium Co. Ltd. was formed on 7 May 1894. The company acquired the British rights in the Bayer process for the extraction of alumina from bauxite, and the Heroult patents for reducing alumina to the ingot metal aluminium.

The first hydro-electric scheme was started at Foyers and the first metal was produced in 1896. Large hydro-electric plants have also been installed at Kinlochleven and Fort William, and alumina works have been set up at Burntisland, Fife, and Newport, Mon. The company also possesses rolling mills at Warrington and Falkirk, extrusion plants at Warrington and a powder and paste works at Latchford Locks. The original Foyers works has been converted to the production of super purity aluminium.

This information is contained in 'The History of the British Aluminium Co. Ltd. 1894-1955' recently produced by the company and containing an illustrated account of the development of the company, together with an estimate of the position that aluminium will hold in the future. The second world war gave a tremendous boost to the aluminium industry and production reached its peak in 1943, declining considerably after that as world air supremacy had been obtained and future requirements could not be estimated. Since the war a research laboratory has been set up at Chalfont Park, Bucks. Here all the routine testing carried out by the various works laboratories is controlled and problems concerned with the company's manufacturing processes are investigated.

Fundamental research which may have no immediate practical application, is also being carried out. The laboratory, through the technical sales department, provides, as well, a technical service to customers.

The uses of aluminium are so diverse that it would be impossible to list them all here. Super purity aluminium is being used, on account of its ductility and resistance to corrosion, for roof coverings, flashings and weatherings. Compounds of aluminium are also finding increasing uses, notably in the paper industry, as constituents of glass, and as high-grade refractories and heat resistant electrical insulators.

Canada Imposes Tariffs

THE Canadian Government has extended tariff protection to segments of the country's growing plastics industry and has announced steps to investigate tolls on chemicals generally. Finance Minister Harris said in his budget speech that the investigations will be carried out by the Tariff Board. The tariff structure on chemicals is out of date and needs overhauling, he said.

The Government, Mr. Harris said, is not contemplating any general change in tariff policy. But he announced that for the first time import tolls of 7½ per cent are being imposed on polyethylene resins. A similar 7½ per cent toll is imposed on phenol formaldehyde resins, generally used in adhesives. However, where they are used in making plywood, they still will be allowed in duty free.

Mr. Harris also announced that the Government is looking into the question of imposing tolls on ethylene glycol.

New Vinyl Acetate Plant

A LARGE plant for the manufacture of vinyl acetate is being constructed at Salt End, Hull, by the recently-formed company, Hedon Chemicals Ltd. Hedon Chemicals Ltd. is a company jointly owned by the Distillers Co. Ltd. and Shawinigan Chemicals Ltd., of Montreal, Canada. Sales will be handled by Shawinigan Ltd., of London, and British Industrial Solvents—a division of the Distillers Co. Ltd.

The directors are: Mr. J. M. Rimington, Mr. W. E. Cash, Mr. J. H. Dunn and Miss H. M. Hyatt, of the Distillers Co. Ltd.; Dr. R. S. Jane, Dr. H. S. Sutherland and Mr. G. Benson, of Shawinigan Chemicals Ltd.; and Mr. A. W. Scott, of Shawinigan Ltd., London.

The Foreman's Role

The important position held by a foreman in industry had often been neglected by senior members of managements, said Dr. W. Jenkins, former head of the Nobel Division of Imperial Chemical Industries Ltd., at a meeting in Glasgow last week, when he delivered the opening address at a lecture discussion course on 'Modern Foremanship.' Dr. Jenkins said that the most difficult stage of management was where it met the workers, and this was why the foreman's job was a serious matter.

The Institution of Chemical Engineers

Duke of Edinburgh Attends Annual Dinner

AT the 32nd annual corporate meeting of the Institution of Chemical Engineers which was held in London on 26 April, John A. Oriel, C.B.E., M.C., M.A., M.I.Chem.E., was elected president in succession to Sir Harold Hartley. Mr. Oriel, who a few years ago lost his sight as a result of injuries from mustard gas during the 1914-18 war, is consultant to the Personnel Administration Department of Shell Petroleum Co. Ltd.

In the evening H.R.H. The Duke of Edinburgh was principal guest at the annual dinner and very ably proposed the toast of 'The Institution.' The retiring president, Sir Harold Hartley, replied and proposed the toast 'The Guests,' to which Dr. Alexander Fleck, F.R.S., chairman of Imperial Chemical Industries Ltd., responded.

At the annual meeting Dr. W. Idris Jones (Director General of Research, National Coal Board), Dr. N. E. Rambush (chairman and managing director, The Power-Gas Corporation), Professor H. L. Roy (chairman of the Institution's Indian Advisory Panel) and Mr. P. K. Standring (Main Board Director, I.C.I.) were elected vice-presidents. Professor M. B. Donald (University of London) and Mr. F. E. Warner (Carless, Capel & Leonard, Ltd.) were elected joint hon. secretaries. Mr. F. A. Greene (a consultant) was elected hon. treasurer. Members of the Councel elected were H. D. Anderson, W. E. Aylwin, C. G. Bacon, K. Fraser, R. C. Odams and J. P. V. Woolam.

At the meeting Sir Harold Hartley gave his presidential address: 'Chemical Engineering—The Way Ahead.' Sir Harold spoke (in part) as follows:—

THE PRESIDENTIAL ADDRESS

TODAY there is a much more general understanding in Britain of the rôle of the chemical engineer, he is no longer regarded as a misnomer or a curiosity and there is a much wider recognition, too, of the contribution that he can make in industry. Chemical engineering laboratories are being accepted as a necessity in many modern industries. The next few years should see a large increase in the output of chemical engineers from the new departments that will give chemical engineering its place in the engineering schools of most of our universities. New laboratories and larger staffs will expand rapidly the volume of research that is so badly needed. Methods of teaching are being revised to give the young chemical engineer the adaptability and flexibility of mind that he needs to face new problems over an ever widening field of activity.

Thanks to the generous offer of the Society of Chemical Industry we are moving soon into new headquarters in Belgrave Square, which will give us a new look.

The Institution has long outgrown its present premises. The generosity of a few kind friends will enable us to furnish and equip our new rooms to the best advantage. The names of our kind friends which we must record appropriately in Belgrave Square are:—The British Petroleum Company, Courtaulds, The Distillers Company, Esso, Imperial Chemical Industries, the Shell Petroleum Company and Unilever.

In 7 or 10 years we shall have outgrown these premises and the SCI will need the rooms for their own expansion. Council has therefore decided that we should at once start a building fund among our members which can accumulate gradually so that when the time comes we shall have the resources to provide a permanent home for the Institution.

The Institution was invited by the OEEC to organise, in co-operation with the DSIR, a European Conference on 'The Functions and Training of a Chemical Engineer in Europe.' The Conference, which was held in London on 21-23 March, was attended by 68 delegates from 12 European countries, 110 delegates from the UK and 165 other members. It included visitors from Australia, South Africa, and the United States.

Sir Christopher Hinton described the spectrum of activities of the chemical engineer with its main focus in the optimisation of the flow sheet before it went to the de-

signer. Dr. Holroyd spoke of the various phases of the technical and commercial development of a new process and the part played by the chemical engineer. Mr. Kearton gave an account of the chemical engineering department of Courtaulds and the contribution it had made to recent developments of the company—like their viscose works in Alabama. From our German colleagues came a different philosophy. Chemists must remain chemists and engineers remain engineers, the planning and design of a plant depending on the co-operation of the chemist with the process engineer. This divergence of opinion from our conception of a chemical engineer came up also in most of the later sessions on education. It was evident, however, that Professor Schoenemann, of Darmstadt, did not altogether share the views of his colleagues as he spoke of the need to give some chemists a technological training, since chemistry was the decisive factor in selecting the flow sheet and the general design of a plant.

The last session dealt with the scope and need of research in chemical engineering. The papers emphasised the need for more research and particularly the need to codify the existing data available for use in detailing design. They also helped to define the fields of work most suitable for academic laboratories for industry and for organisations like the Research Institute for Process Engineering at the Technische Hochschule at Aachen, which is a co-operative effort of the Government, industry and the Technical High School. The speed with which this new institute has come into action and its obvious advantages are in sad contrast to the delay in implementing the Cremer Report which years ago recommended the formation of a similar organisation in this country. In my opinion this is the next major project to which the Institution should devote its energies and advocacy.

Growing Demands

We are face to face with the problems involved in meeting the growing demands for higher standards of living for the ever increasing population of the world. One fact is abundantly clear, that chemical engineering is intimately involved in supplying all those major needs—whether they are food, fuels and energy, water, metals, materials and drugs such as antibiotics. The techniques of chemical engineering are being applied every day in new fields.

In spite of alternatives like plastics and bonded materials and the use of scrap the demands for virgin metal are rising. There is also the increasing use of new metals like titanium, zirconium and beryllium. At the same time many of the richer ore deposits are being depleted and we are dependent more and more on lower grade ores. For the treatment of these the older physical methods of ore dressing producing concentrates for smelting are proving inadequate, and they are now being supplemented by various chemical engineering techniques.

Chemical Treatment of Ores

There are two main developments, first the recent extensions of the old method of leaching the ores or the tailings from previous extractions with solutions, sometimes under pressure, to dissolve out the metal contents, and secondly the treatment of the ores in a fluidised bed. The advantage of the leaching process is that it can be used for very low grade ores and allows the separation of different metals by a variety of different methods, precipitation, electrolysis, solvent extraction or extraction by ion exchange resins.

The fluidised bed method of treating ores under controlled temperature conditions with various gases also offers a number of possibilities. Iron oxide can be reduced to magnetite for magnetic extraction and commercial plants already exist for using this technique for roasting pyrites. Copper nickel and cobalt ores can be converted to sulphates or chlorides by treatment with sulphur dioxide or chlorine in a fluidised bed, followed by leaching with water.

Another important aspect of the chemical approach to problems arising in ore treatment is the extraction of metals from the slimes that are often unavoidable and may carry sufficient of the metals to prevent the economic exploitation of a low grade deposit. Selective flocculants are giving promising results and the polyvalent ions are being used as flocculants in the recovery of uranium from large quantities of slimes from the treatment of Florida phosphates.

Another process under development is the extraction of gold from cyanide solutions by active carbon which would effect a considerable economy in cyanide and might avoid a considerable capital expenditure on thickeners and filters.

It is essential that Britain with her large mining interests should keep abreast of progress. This seems to me to involve a new approach to technological education in the field of mining and extractive metallurgy. In the United States mining engineering is kept separate from mineral engineering which includes all processes of ore treatment and extractive metallurgy, in which chemical engineering techniques are now so intimately involved. Some such innovation is needed here and it is suggested that some universities should establish departments of mineral processing and extractive metallurgy working in close touch with the departments of chemical engineering.

I have been criticised for suggesting that there is anything new in biochemical engineering, which my critics say is just the application of living catalysts in place of, let us say, platinum and that it needs no new techniques. My reasons for differing from this view are quite simple. During the lifetime of an inorganic catalyst it will continue to exert the same influence on any given chemical system with declining activity as it is gradually poisoned or rendered inert. The living cell is entirely different as it often passes through various metabolic changes in its lifetime when its growth phenomena and its excreta undergo radical alterations on which its industrial application must be based. There are, too, such phenomena as the rapid alternation of light and dark reactions in the metabolism of photosynthetic organisms like *chlorella* of which its industrial use must take account.

Exciting Prospects

In addition there are the exciting prospects of the genetics of the living organism, hybridisation by sexual reproduction, the alterations induced by radiation and change of environment, and the possibility of training the cell to do its job more efficiently as shown by the work of Sir Cyril Hinshelwood.

In industrial fermentations based on a sexual fungi, strain improvement has hitherto been based on selection either among large collections of strains from nature or from spontaneous or induced variation in one strain. Professor Pontecorvo's development of what he calls the para-sexual mechanism, the directed entry of two nuclei of different strains into a single cell, opens up the new possibility of breeding improved industrial strains.

So I am quite unrepentant in claiming a special place for biochemical engineering as a post-graduate subject in which a background of the characteristics of the living cell and enzyme systems would be added to a training in the techniques of chemical engineering. The value of such a dual experience is proved by the rapid progress it made possible in the production of antibiotics.

Fermentation of Sugars

In the fermentation of sugars to alcohol, in spite of the complexity of the system, the close relation of the alcohol formed to the sugar utilised shows the kinetic interdependence of these two processes. But this is an exceptionally simple case. Usually the relations between growth oxidative metabolism and product formation are far more complex. In the production of citric acid from sugar by *Aspergillus Niger* there is first a growth phase when the sugar is used primarily for tissue synthesis with little acid production followed by an acid production phase, with a short intermediate period of growth after which the sugar is again mainly converted to citric acid.

In the biosynthesis of penicillin, where the free energy is supplied by the oxidation of sugar, after an initial growth period the penicillin synthesis is highest when the carbohydrate utilisation and oxygen uptake have all decreased indicating that the penicillin is formed by some secondary process and the free energy required is furnished in part by processes other than the oxidation of the sugar.

These examples give some idea of the varying nature of these fermentation processes and the close study which is required to decide on their most economical use in industrial production. This involves the investigation of the optimum environment for the fermentation, including nutrient concentrations, temperature, agitation and supply of oxygen, and on the microbiological side the study of the tendency of any particular strain to mutate and the search for the most efficient and constant strains of organisms.

In many cases plants have been designed and the instruments and control added later and in fact all processes are really manually controlled because every major load change

in general requires re-setting to the desired values of all the controls. Electronic devices are much quicker and more accurate than the human senses and with appropriate servo-mechanisms they offer great advantages. With the rapid advances in the design of automatic controls, design engineers have been able to make considerable improvements by the incorporation of the latest standard instruments as they come on the market. Recently this approach to the process design problem, the addition of controls to process flow sheets, has reached something of a stalemate. It is now clear that the major advances will only be achieved if the use of automatic control is considered in the earliest design stages. This means that there must be consultation between the chemical engineer and the automatic control engineer from the earliest stages.

New Approach Needed

We must move on from the stage of adding process controls in an empirical manner. This is not an easy matter however and it will call for a basically new approach to the problem of process design. Two difficulties appear to stand out. First there is a grave shortage of automatic control engineers with the necessary experience. Coupled with this is the shortage of chemical engineers with sufficient understanding of the theoretical approach to automatic control. Secondly there is an almost complete lack of the information on plant and process characteristics which is required to enable automatic controls to be applied in a scientific way.

A twofold approach is necessary. On the one hand the characteristics of the plant, its reactions to disturbances, can be investigated on the laboratory and semi-technical scale and compared with theoretical predictions, thus building up a body of tested knowledge and technique with which to predict the characteristics of a full scale plant. On the other hand, it is essential that every opportunity should be taken of determining the reactions of plants to disturbances in their working conditions so that we can accumulate a body of knowledge of their dynamic characteristics, which can then be correlated with the preditions of their behaviour based on theory checked by laboratory and semi-scale investigations. Only in this way will it be possible gradually to accumulate data and experience of plant characteristics in order to apply theory with confidence to determine the design and method of operation to give the most economical results by means of quality control. The urgent need to collect data concerning the operating characteristics of full scale plants and particularly to carry out the basic theoretical work is another strong argument for the co-operative research institute. In this connection it is most encouraging to see that Imperial Chemical Industries is now extending very considerably its Central Instrument Laboratory in order to accelerate the work directed to the improvement of control system design.

These three fields of development present problems for the universities and colleges of technology if they are to progress and if this country is to keep its place in the forefront. In the undergraduate course they can obviously only be outlined briefly in a review of possible fields of specialisation which a chemical engineer might follow. Clearly the future undergraduate training in engineering must be concentrated on those parts of the basic sciences and mathematics which are relevant to its major activities and on the methods of their application to engineering problems, leaving the practical training to vacation courses and the initial years in industry. The other essential content of the academic course is to give the student some opportunity to grasp the essential part that research must play in development and to understand how it must be integrated with management.

Bridge With Other Departments

It seems to me that there is a new responsibility thrown on the chemical engineering departments to help in building a bridge between their own and the other departments concerned, microbiology, mining engineering and control engineering and electronics. The existence of these bridges would enable postgraduate students who are attracted by the opportunities which these new fields offer to get the necessary training in a second range of techniques. I see clearly the need for postgraduate courses in a number of such borderline subjects in universities or colleges of technology selected for the dual opportunities they can offer. I am glad to know that some courses in biochemical engineering are already in contemplation.

THE ANNUAL DINNER

PROPOSING the toast of the Institution at the annual dinner, the Duke of Edinburgh said he was delighted to do so, both for the Institution itself and particularly because Sir Harold was in the chair. Since he had succeeded him as president of the British Association, Sir Harold had been of the greatest possible help to him personally in all matters connected with science. One knew now that chemical engineers were his passion; and he was the greatest of salesmen.

The relatively recent formation of the Institution marked the full acceptance of chemical engineering as one of the primary technologies, alongside civil, mechanical and electrical engineering. Those other institutions had done a great deal to encourage the application of science and to maintain high professional standards, and one had no doubt the Institution of Chemical Engineers was doing exactly the same thing.

The members of the Institution would agree that there were not enough chemical engineers. The solution of the problem rested to a very large extent with the Universities. The two universities of which he had the honour to be Chancellor were in fact doing something about it. Edinburgh had a new Chair of Chemical Technology; Wales had a Chair of Chemical Engineering at Swansea, occupied by Mr. E. S. Sellers.

Must Maintain Position

If we wished to maintain our standards of living, to help the more backward countries, if we wanted our voice to be heard in the counsels of the nations, we must maintain our position in the van of technical progress, and we could not do that if we neglected any branch of science or technology. He did not think many would deny that we had made rather a late start in chemical engineering; but now, under the auspices of the Institution, he was quite sure that chemical engineering would flourish and play its full and proper part, to our national benefit.

On behalf of the Institution and the assembled company Sir Harold thanked His Royal Highness for the honour he had done them by his presence, which gave them the opportunity to say how grateful they were to him for the great interest he took in everything which affected the wellbeing of industry and of technology in the United Kingdom and the Commonwealth. They had in mind the emphasis he always placed on the need for the quick application of research in industry; his encouragement and leadership meant so much to everyone, and especially to the young.

Dr. Fleck a Pioneer

Coupling with the toast of the guests the name of Dr. Fleck, chairman of Imperial Chemical Industries, Ltd., the President recalled his pioneer papers, more than 40 years ago, on the new radioactive series, papers which were the experimental justification for the theory of isotopes, one of the greatest revolutions in the history of chemistry. At long last those papers, with their originality, their distinction, their experimental elegance, had been recognised by Dr. Fleck's election as a Fellow of the Royal Society. Not the least of his many great achievements were his contributions to chemical engineering. The Institution was proud to have him as a member.

Dr. Alexander Fleck, D.Sc., LL.D., M.I.Chem.E., F.R.I.C., F.R.S., responded to the toast. In his reference to chemical engineering he said it was sometimes regarded as a new profession, the child of chemistry and engineering; indeed, he had even heard it referred to in terms indicative of doubtful respectability of parentage. That was a monstrous calumny, for the legitimacy of chemical engineering could not be challenged. Even to talk of chemical engineering as the child of chemistry and engineering was, he believed, historically wrong.

Sir Harold Hartley then formally invested his successor, Mr. John A. Oriel, with the Presidential Chain of Office, and said it was the members' recognition of the admiration and affection they all felt for Mr. Oriel. They had admired so much the courage and the equanimity with which he had faced and overcome difficulties, and they knew the traditions of the Institution could not be in safer keeping.

Mr. Oriel said how much he appreciated the honour the Institution had done him. He knew of no-one who had added more to the status and dignity of the Institution than had Sir Harold Hartley, whose example he would do his best to follow.

The Osborne Reynolds Medal and the

Scroll, was presented by Mr. Oriel to Sir Harold Hartley. He said no-one had worked more for chemical engineering than had Sir Harold, under whose guidance the Institution had been enabled to fulfil its part, commensurate with the ever-increasing importance of chemical engineering.

Water-free Hydrazine

AN improved method of producing water-free hydrazine was described for the first time to chemical engineers meeting at Houston, Texas, on 2 May. Hydrazine, used as a powerful reducing agent in organic reactions, is also currently of interest as a high-energy fuel for rockets.

J. W. Clegg, manager of chemical engineering research at Battelle Institute, Columbus, Ohio, described the new process in a paper, 'Dehydration of Hydrazine by Azeotropic Distillation,' presented before the Extractive and Azeotropic Distillation Symposium of the Americin Institute of Chemical Engineers. Co-authors of the paper were R. Q. Wilson, W. H. Mink, and H. P. Munger.

In conventional methods for producing hydrazine, the first step yields a dilute water solution. By simple distillation it can be concentrated only to a solution containing about 70 per cent hydrazine. The anhydrous, or water-free material, until now, has been obtained through additional chemical processing, but this is relatively expensive. The patented Battelle-developed distillation process results in water-free hydrazine directly, thereby reducing production costs.

London OCCA AGM

THE 17th annual general meeting of the London Section of the Oil & Colour Chemists' Association was held on Tuesday, 26 April, Mr. R. F. G. Holness, the retiring chairman, presiding.

Proposing the adoption of the annual report, Mr. H. C. Worsdall, hon. secretary, said it was gratifying to note that the membership was still increasing and that attendance at meetings continued at a very high level.

Proposing the election of Mr. H. A. Newnham as chairman, the retiring chairman said Mr. Newnham had done excellent work as hon. treasurer of the Section over the past five years and those same down-to-earth characteristics which he had then displayed would stand him in good stead in the chair. The nomination was seconded by Mr. D. E. Roe and was carried.

Mr. J. B. G. Lewin, proposing a vote of thanks to the retiring chairman, said whatever else might be said of chemists they were certainly vocal and one had only to serve on a committee of chemists to realise that even the most innocent looking proposition had many sides to it. From the voices so raised, rather like a good choir master Mr. Holness had always produced harmony by exercising unfailing tact and subtle powers of persuasion. Mr. Holness, in reply, thanked all the Committee members who had served with him and the officers who had made his term of office such a happy and inspiring experience.

Mr. H. C. Worsdall was elected hon. secretary; Dr. S. R. W. Martin, hon. treasurer; Mr. J. A. L. Hawkey, hon. publications secretary, and Mr. W. H. Campbell, hon. auditor. G. W. Mack, G. A. Newell and J. E. Pooley were elected to the committee.

Chemical Technology

FUNDS amounting to £60,524 have been contributed by industrial and other interests to an appeal by Edinburgh University and the Heriot Watt College, Edinburgh, for the foundation of a Chair of Chemical Technology. Last October, Principal Sir Edward Appleton, Vice Chancellor of the University, announced that £50,000, the preliminary target had been exceeded. Since then a further £10,000 has been subscribed and at a luncheon held in Edinburgh on 25 April Sir Edward thanked the representatives of the additional donors.

Industry, he said, needed more technologists to see that existing processes were carried through at the highest possible efficiencies and in the development of new technologies. Advances both of old and new depended on scientific research.

Mr. W. R. M. Watson, chairman of the Scottish District, British Paper and Board Makers' Association, replied for the guests and said that they regarded the funds contributed as an investment rather than as a gift. They hoped to get a dividend, tax free, in the form of students who would be attracted to their industry.

Premises for the new section will be provided in the building now under construction and a new degree B.Sc. (Tech.) will be introduced.

The British Industries Fair, 1955

'Holding Operation' by Chemical Industry

THE 34th British Industries Fair opened on Monday, 2 May, at Olympia and Castle Bromwich, Birmingham. The official opening took place at noon at Olympia, the ceremony being performed by Lord Mountbatten. On Tuesday, 10 May, the Queen and the Duke of Edinburgh will visit the stands at Olympia.

This is the first BIF to be run as a commercial concern, without Government subsidy, except for publicity costs. There are altogether about 1,600 exhibitors, 1,000 at Castle Bromwich and 600 at Olympia. This compares with nearly 2,000 last year. The chemical industry is not prominently represented at the fair. There is an ABCM stand at Olympia, and some individual firms are exhibiting in specific sections, but there will be a bigger participation next year (see THE CHEMICAL AGE, 1955, **72**, 24). The present showing is described as 'a holding operation.'

The Castle Bromwich section of the fair concentrates on engineering and hardware. At Olympia there are exhibits of chemicals and allied products, plastics, drugs and pharmaceutical preparations, textiles, including synthetic fibres, and scientific instruments. More than a dozen chemical plant manufacturers are represented at Castle Bromwich.

Castle Bromwich Stands

The main theme of Metal Propellers Ltd. exhibits is once again distillation equipment in stainless steel for the oil refinery and chemical industries. Exhibits include Glitsch 'Truss-type' bubble trays of two different designs.

Several divisions of I.C.I. are showing. Nobel Division are showing silicone oils, resins, rubbers and miscellaneous products for mould release, foam suppression, waterproofing masonry and textiles, heat-resistant paints, electrical insulation, mouldings, extrusions, and for coating glass and asbestos cloth. Plastics Division have chosen for their theme 'Plastics for the Moulder.' They are showing the extensive range of compression and injection moulding materials which the division manufactures. Of particular interest on the Metals Division stand is the display of wrought titanium products. There is also a display of wrought non-ferrous metal products—copper, brass and aluminium sheet, strip, rod, tube, wire and plate—supplemented by exhibits showing their specific application in various industries. Of considerable interest to the chemical and oil refining industries is the display on Marston Excelsiors Ltd.'s stand of aluminium alloy pipework, bends and tees.

Barrier Creams

Rozalex Ltd. are showing their new barrier creams, described recently (THE CHEMICAL AGE, 1955, **72**, 802). Stainless steel in all forms and finishes, such as sheets, strip, bars, tubes, sections, wire and components is the feature of Padley & Venables Ltd.'s stand. Dunlop Rubber Co. Ltd. exhibit engineering components and rubber industrial products, including the latest range of fortiflex containers, anti-corrosion and abrasion resisting linings and PVC fabrications. A representative cross-section of their permanent and electro-magnetic equipment is being displayed by Rapid Magnetic Machines Ltd. In addition to the already extensive range of swarf separators there is the multi separator for treating the more complex swarf, scrap, etc.

Materials handling is an increasingly important aspect of industry, and among the two firms showing equipment, such as trucks, are Lansing Bagnall Ltd. and Yale & Towne.

GWB Furnaces Ltd. are exhibiting the smallest and the largest units in their range of Powermaster oil/gas fired boilers. Also on display are two packaged, electrode-type boilers, products of the associated company, Autolec Boilers Limited.

The stand of Borax Consolidated Ltd. is devoted entirely to a display and demonstration of Boraxo, a powder-type hand cleanser which is claimed to remove grease, grime and chemicals from workers' hands without damage to the skin. At the Fullers' Earth Union Ltd. stand the main emphasis is on Fulbond for bonding foundry sands. Other exhibits show activated fullers' earth for bleaching vegetable and mineral oils and for regenerating used lubricating oils. Other

uses of activated earths are as catalysts in certain polymerisation and alkylation reactions.

The General Electric Co. Ltd. are this year portraying a representative cross-section of the company's activities. The principal sections of the stand are devoted to power generation, and its use in industry, electronics and communications, lighting and domestic equipment. A shore-end section of the type of copper cable to be used in the first trans-atlantic telephone system between the UK and North America has been lent by the GPO for display on the stand of the Copper Development Association. Other CDA exhibits include precision made copper alloy blades for a gas turbine compressor, examples of continuously cast copper alloy rods and a gunmetal gear-type pump.

Plastics Facilities

A varied display of Lorival mouldings, extrusions and fabrications in a host of materials is a feature of Lorival Plastics stand. It is arranged to show the design versatility and comprehensive production facilities available to the user of plastics or hard rubber products in industry. Several new developments are featured by Electromagnets Ltd. Among them is the patent Select-O-Load control system, exhibited in conjunction with a rectangular lifting magnet selecting thin steel plates individually. This has never been satisfactorily accomplished with normal heavy duty lifting magnets prior to the introduction of this new system.

An increased range of Permali components and equipment is shown by Permali Ltd. Three grades are now in full production—a standard grade for normal HT and LT electrical insulation purposes and mechanical duties, a special HT and LT electrical grade for tropical and high humidity applications and a special chemical-resisting grade for moisture and corrosion-resisting parts and water-lubricated bearings.

Relays and process timers are in prominence at Londex Ltd.'s stand, which this year is larger than in the past, but in the same position. 'Heat for Industry' is the main theme of the Gas Council's exhibit. The three main sections of the stand are devoted to the plant maintenance and repair shop, direct fired air heating for processes and the pottery and ceramic industries.

The latest addition to their range of sieving and straining machinery, the Russell Elevator is on show at the stand of Russell Constructions Ltd. The elevator is designed mainly as an ancillary piece of equipment in conjunction with the sieving machines but it should find applications in industries where powdered materials have to be elevated and fed at a predetermined rate to apparatus carrying out various processes.

On show for the first time at the stand of Dohm Ltd. is resin coated sand for shell moulding, marketed under the name of Dohmfrac. Among other items on show are graphite of 99 per cent purity and Dohm vermiculite insulating material.

The wide range of plastics produced by Bakelite Ltd. and applications for them in many industries are shown. Materials include thermosetting and thermoplastic materials, laminates, extrusion materials, resins and adhesives.

G. R. Turner Ltd. are showing what is claimed as 'the only conveyor at present made in the world which will move loose materials up hill and down dale in a very small space.' The prototype machine has a speed of 50 ft. per min. and a carrying capacity of 350 tons per hour, but it is expected that in actual service it will reach a speed of 200 ft. per min. and carry a peak load of 450 tons per hour.

Exhibits at Olympia

The Association of British Chemical Manufacturers are one of the exhibitors at Olympia. A feature of their stand is a scale model showing the industry's plans for the 1956 BIF Chemical Section.

British Celanese Ltd., British Nylon Spinners Ltd., Courtaulds Ltd. and I.C.I. are among the firms represented in the textile section. I.C.I. Terylene Council are showing for the first time furnishing fabrics which have been specially commissioned and are expected to be on the market before long. There are also displays of Ardil blended fabrics.

A number of firms in various fields of the plastics industry are exhibiting. Among them is Dunlop Special Products Ltd. (Plastics Division) who are showing duvina PVC sheeting in different uses.

Benn Brothers Ltd., proprietors of THE CHEMICAL AGE, have stands both at Olympia (A.9) and Castle Bromwich (A.427). Visitors will be welcomed.

British Oxygen Changes

Subsidiary Companies Planned

SHAREHOLDERS have been informed of major changes that are to take place in the structure of the British Oxygen Company Limited and its subsidiaries. The re-organisation plan will be put into operation as from 1 October.

The British Oxygen Company give the following four main reasons for these changes: the great increase in the trading interests of the company since the war. The consolidated gross assets of the company have grown from £11,500,000 in 1945, to £37,500,000 in 1954, a three-fold increase; the need to organise to meet the increased demands that seem likely to arise in the future; the consequent decision to decentralise responsibility with its attendant advantages; the desire to promote a number of senior executives in the company with many years service.

A new operating subsidiary company, British Oxygen Gases Limited (authorised share capital £15,000,000) is to be formed as from 1 October, to undertake all trading operations in industrial and medical gases and equipment, at present carried out by the parent concern, British Oxygen Co. Limited. In addition, the existing Chemicals Division will be similarly formed into a new subsdiary British Oxygen Chemicals Limited.

In this connection, it has been decided to appoint to the board of the parent company two new directors, Mr. T. E. Potts, at present managing director of African Oxygen and Acetylene (Pty.) Limited, and Mr. J. Strong, at present managing director of Quaisi-Arc Company Limited and Fusarc Limited (see last week's issue, p. 999).

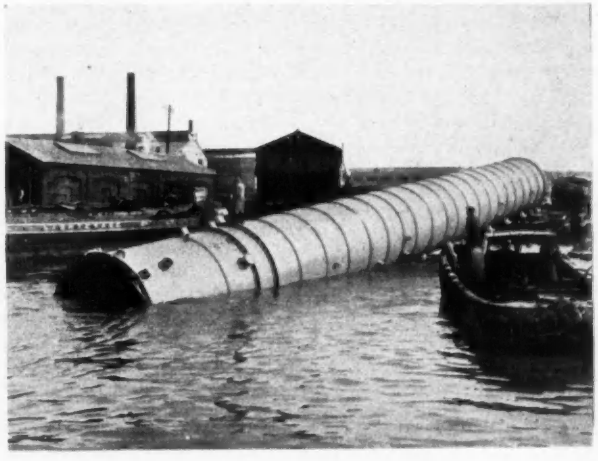
Arrangements are also in hand for the grouping of BOC interests in electrode manufacture and electric welding processes, including the activities at present carried out by the Quasi-Arc and Fusarc Companies.

Nationalisation

HEAVY chemicals would be brought under public ownership if a Labour Government is elected according to the party's election manifesto, 'Forward with Labour.'

Commenting on this proposal, *The Financial Times* points out that it comes at a time 'when the chemical industry is leading the advance in national output.' Last year production rose by 10 per cent, against an average for manufacturing industry of 7½ per cent. The newspaper points to I.C.I's record figures for last year and says that 'in this atmosphere of expansion, the threat of nationalisation sounds both strange and discordant. Difficult as it would be to implement, it is not taken lightly and will be fought to the end if necessary.'

In June £2,650,000 will be spent in giving a 5 per cent bonus to every employee of over 2½ years' standing—1 per cent for every point by which the ordinary dividend exceeds 5 per cent. This profit-sharing scheme should give the employees a better understanding of the company's operations, says *The Financial Times*, and this should prove an antidote to propaganda.



As reported last week (p. 984), a 140 ft. column went by sea from Greenwich to Grangemouth recently for the Forth Chemicals, Ltd's. plant for monomeric styrene. Here the column is seen entering the Thames at the beginning of its journey

Health & Disease in Industry

British Occupational Hygiene Society

THE fourth conference of the British Occupational Hygiene Society was held at the London School of Hygiene and Tropical Medicine on 4 April, 1955. The President, Dr. J. M. Rogan, occupied the chair.

Dr. Ronald Stewart, Chief Medical Officer of the Austin Motor Company, read the first paper. He defined occupational health as the application of medical knowledge to the employment circumstances of the individual which affect his physical and mental well-being. A unique opportunity to promote health was offered to those who managed industry, and it was vitally important that technical and medical advice of high quality should be available for them. Legislation in this field had a far-reaching effect and should be carefully planned.

Occupational health extends far beyond curative medicine and must enlist the aid of experts in engineering, toxicology, chemistry, etc., but wide problems of clinical medicine are still important in industry, and concern with environmental and epidemiological studies alone is inadequate.

Illness due to toxic substances, disabilities arising from accidents, psychiatric disturbances associated with occupation, and aggravation of disease processes by work demands are all familiar to the industrial practitioner. Another aspect of the clinician's work is concerned with the placement of workers; many disabled workers are effective producers in the right job. Work study is a natural corollary to clinical assessment of capacity and may also reveal toxic or physiological hazards. An opportunity exists for adapting present-day techniques of job analysis to the requirements of workers in the field of occupational hygiene and medicine.

Assessment of Health

Aids to the assessment of health in industry included the provision of machinery for carrying out investigations, the availability of expert advice and the provision of an information service. The respective responsibilities of Government departments, Universities, research bodies and of industry itself need to be thought out with these problems in mind.

Most of the discussion on Dr. Stewart's paper centred round the provision of ancillary services, such as X-ray, dust counting and chemical analysis, upon which the industrial doctor could draw. Help which had been given in certain cases by the Public Health Laboratory Service, the Factory Department and the Medical Research Council was mentioned, and it was suggested that the Public Analysts might extend their work beyond the analysis of water and food to include estimation of toxic substances. In reply, Dr. Stewart said he thought that the country could not afford to have such investigations carried out at the public expense and that industry should pay for them, and would be willing to do so if proper arrangements were made; a lead should be given here by the Ministry of Labour.

Medical Inspections

The next paper, by Dr. R. Murray, H.M. Medical Inspector of Factories, Manchester, dealt with the medical work of the Factory Department.

The Department worked through its medical inspectors whose duties included investigations of industrial disease, the supervision of appointed factory doctors and liaison with factory medical officers and others concerned with occupational health. The appointed factory doctors were general practitioners who carried out statutory medical examinations of young persons and periodic examination of workers exposed to special hazards; they also reported cases of notifiable industrial diseases and of gassing.

In the ensuing discussion tribute was paid to the work of the non-medical inspectors—chemical, engineering and electrical. Out of a total of 400 inspectors only 13 were medical; the number of factories served was about a quarter of a million. The industrial nurse also occupied an important position and in many factories there was only a nurse with no full-time medical officer. Concerning the notification of certain diseases, attention was drawn to the unnecessary duplication which resulted from the definition of both notifiable and prescribed diseases; the necessity of ensuring that the employer

should be aware of his responsibilities in the matter was mentioned.

The third paper was presented by Dr. R. McL. Archibald, Medical Officer, North-Eastern Division, National Coal Board. Considering health, he emphasised that the pre-employment medical examination should be related to the industry which it served. A standard which would be perfectly satisfactory for light work might not be good enough in heavy industry. Productive occupation for rejects from occupations involving severe stress must be sought for in work making smaller physical demands. There was an enormous variation from the normal, within the range of physical fitness. The medical examination should be directed towards finding the most suitable job for the applicant, with regard to his physical capacity, not to the elimination of persons unlikely to be able to fill a particular post.

Dr. Archibald mentioned many important practical aspects of the work of the industrial medical officer. These included his place in pilot experiments with new substances, the need for prompt evaluation of hazards, the importance of familiarity with men, management and plant, the keeping of records and collaboration with engineers and scientists. The problems that had to be dealt with were usually quite mundane and research should be conceived with this in mind.

Discussion

Points raised in the discussion included the position of the industrial medical officer in relation to general practitioners. When the factory medical department was closed the worker had to go to the latter who also had the advantage of being backed by the hospital service. The workers might tend to use their general practitioners on all occasions. The works medical officer had to provide, with the help of his management, an effective service which would encourage his cases to come to him; if he provided himself with technical assistance it would enable him to carry out his investigations more satisfactorily.

The necessity of observing the effect of standards in pre-employment medical examinations was emphasised; it would not do to exclude a large section of the population from industry.

The final speaker was Professor A. Bradford Hill, F.R.S., of the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine. He spoke of the relationship between the deaths of men employed in different ways to the number of men so employed as revealed by the analysis of death certificates and of the census. Such statistics require cautious interpretation—for instance, a relatively high death rate in a light occupation may only mean that the physically unfit are attracted to it. Again, the death certificate records the occupation followed at the time of death, whereas the cause of death may be associated with an earlier occupation. The mortality of wives of men engaged in different occupations is also recorded on the death certificates of the latter, so some separation of specific occupational influence from that of general environment is possible. These routinely collected mortality statistics are unlikely to solve problems, but they do at least bring them to notice and promote research.

Sickness Incidence

The measurement of sickness incidence raises still more difficulties. Defining it as 'incapacity to work' brings into the recorded rate not only pathological conditions, but many other social, administrative and economic factors which influence the rate of incidence and complicate comparison within and between industries. The aim of sickness recording in occupational hygiene is to promote the development of preventive measures. It is doubtful if a national system would give worthwhile returns for the heavy work of collection and analysis.

Analogous experiences in measuring health and disease in the coal industry were mentioned in the discussion. The vast majority of miners with massive fibrosis of the lungs died outside the industry; another disadvantage of using death as an index of occupational hazard was the number of diseases, particularly the rheumatic ones, which did not kill. Absenteeism was a possible index for which exact figures were available, but at present they were quite impossible to interpret. This was being investigated by the National Coal Board. It seemed probable that the only place in which health could be measured in relation to an industry was not in the industry itself, but in the industrial community. One of the main difficulties here was in getting a reproducible lower limit to the various diseases.

Safety Notebook

SOME changes in the regulations for the protection of workers who use certain specified poisons in agriculture and horticulture came into operation on 2 May. The new Statutory Instrument includes the earlier regulations, which came into force on 1 July, 1954, amended where necessary in the light of experience. The principal changes in the regulations are:

A new organo-phosphorus substance whose trade name is Metasystox is added to the list of substances specified in the Regulations, but protective clothing (rubber gloves and face-shield) is needed only when the concentrate is being handled.

When systemic poisons are applied to the soil under gravity pressure only, the protective clothing requirements have been relaxed. An overall, rubber gloves, rubber apron and rubber boots have to be worn for this operation. In addition a respirator must be worn if demeton, dimefox or mazidox are used for soil application in a greenhouse. Some poisons are absorbed by the roots of plants and are then distributed in the plant so as to render the plant poisonous to insects: these substances can be applied to the soil and are the subject of this alteration.

The chemical and common names of the substances specified in the regulations have been brought up-to-date.

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THE safety record at I.C.I. Billingham is going slowly downhill, the Divisional Safety Officer, Mr. J. D. Deverell, said at a recent Divisional Council meeting. For the first time since the war there has been no reduction in the annual rate of lost-time accidents as compared with the previous year. In March there were 36 lost-time accidents giving a frequency rate of 1.25 which was about the 1951 figure. I.C.I. target figure is 0.5.

* * *

PROTECTIVE Footwear Service Ltd., Bristol, have outlined several case histories of workers who have avoided being seriously injured by wearing protective shoes. An example was the case of a man who had the alarming experience of a truck weighing 4½ tons passing over his foot. The shoe he was wearing, although distorted, gave his toes full protection and he was able to continue work the next day. Protective Footwear Service Ltd. are suppliers of the Plus Fifty range of safety boots and shoes.

* * *

THE I.C.I. Inter-Divisional Safety Trophy, introduced three years ago, has been won for the second time by the Wilton Services and Construction Works, with an accident frequency rate of 0.77 per 100,000 working hours.

* * *

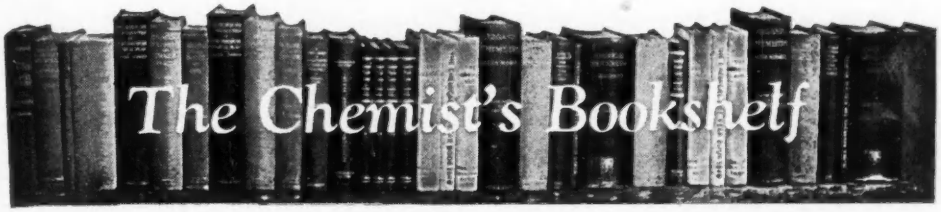
THE combined accident frequency rate for Monsanto Chemicals Ltd. factories during 1954 was 0.2 per 100,000 man-hours worked, the best figures attained. During the year the Newport plant established a record of more than 2,000,000 accident-free man-hours and the Ruabon plant at the end of the year had achieved an unbroken record of 2,143,934 man-hours of safe working.

* * *

THERE were nine fatal accidents in factories making chemicals, oils, soap, etc., in March, and the total number of people killed in industrial accidents during the month was 114. There was one death from compressed air illness. Also reported were 42 cases of chrome ulceration, 13 of skin cancer and eight of lead poisoning.

* * *

A NEW range of attractive spectacles, known as the Highway pattern, have recently been introduced by Fleming Safety Goggles (Division of J. & R. Fleming Ltd.). They are of flesh coloured plastic and of modern design. Three bridge widths are available, so that it should be possible to see that everyone using them is comfortably fitted. Normally the Highway spectacles are fitted with Armorglas, toughened lenses, to give protection against heavy blows from metal or stone, but a range of coloured lenses is available for those who require protection against glare or infra-red and ultra-violet radiations.



PROGRESS IN STEREOCHEMISTRY. Edited by W. Klyne. Butterworths Scientific Publications, London; Academic Press Inc., New York. 1954. Pp. x + 378. 50s.

In the early 1930's Pauling demonstrated the essential quantum mechanical basis of molecular geometry in terms of directed orbitals and the criterion of maximum overlap. Such fundamental and revolutionary notions inevitably stimulated renewed interest and activity in all aspects of research involving stereochemical considerations. It is not surprising, therefore, that there have been many significant advances in stereochemistry during the past 20 years, and that these have impinged impartially upon physical, organic, and inorganic chemistry. It will be equally apparent that for some time there has been a rapidly growing need for a comprehensive survey, and appraisal of such developments. The present volume meets that need admirably. It is in a certain sense a collection of review articles, each by a well-known authority, but as such it has the unusual merit that a significant attempt has been made to correlate the different topics. This has involved both the editor and the contributors in much extra labour, but their joint effort has been well worthwhile.

The following chapter headings indicate the scope of the book:—The Shapes of Simple Molecules (A. D. Walsh); The Conformations of Six-membered Ring Systems (W. Klyne); Stereochemical Factors in Reaction Mechanisms & Kinetics (P. B. de la Mare); The Relationships between the Stereochemistry & Spectroscopic Properties of Organic Compounds (E. A. Braude and E. S. Waight); The Correlation of Configurations (J. A. Mills and W. Klyne); The Stereochemistry of Compounds of High Molecular Weight (E. J. Ambrose); Stereospecificity of Enzyme Reactions (V. P. Whittaker); The Stereochemistry of Complex Compounds (R. S. Nyholm); and Bond Lengths & Valency Angles (A. Maccoll).

The production exhibits the care and elegance we have come to expect from the publishers. The price may appear a little high but the precise stereochemical diagrams must have involved much careful draughtsmanship.—H. MACKLE.

CHEMISCHE TECHNOLOGIE. Volume IV. Edited by K. Winnacker and E. Weingaertner. Carl Hanser Verlag, Munich. 1954. Pp. xxviii + 1192. Cloth. DM. 95.50.

The appearance of Volume IV completes the publication of this comprehensive five-volume textbook on chemical technology. The other volumes have already been reviewed in these columns. Volume IV is the second of two volumes on organic technology.

The subject is treated by consideration of various industries rather than in terms of unit processes. The volume opens with a chapter on aromatic intermediates which is followed by articles on the production, properties and uses of dyestuffs. Detergents, plastics (including silicones), explosives and terpenes are dealt with in separate sections and there is an excellent chapter on the production of photographic plates and films. Later chapters discuss the technology of leather, paints, pesticides and foodstuffs. The volume closes with an article on medicinals which includes sections on chemotherapy, antibiotics, vitamins, hormones and vaccines.

This book covers a very wide field in a comparatively short space. However most of the contributors provide excellent surveys of their industries, and a large number of references to reviews and to the original literature makes additional information readily accessible. Useful economic details are also given, and some of the articles include sections on specialised testing techniques which are encountered in certain industries. The book contains subject and author indices which cover Volumes III and IV. Printing and binding are excellent.—J.C.P.S.

Change in Textiles

Relationship with Chemical Industry

THE development of synthetic fibres will change the face of the textile industry in the next few decades, said Mr. H. Jackson, joint managing director of I.C.I. Dyestuffs Division, when he addressed Textile Institute members at the Mather Lecture in Bolton, on 'The Inter-Relationship of the Chemical and Textile Industries.'

After reviewing the progress of the two industries from the 18th century to the present day, Mr. Jackson said that both had advanced independently of the other, but the discoveries made on both sides had culminated in a very close relationship through the development of man-made fibres.

Seven years had elapsed between the discovery of nylon and its successful launching: £10,000,000 had been spent on research and £70,000,000 on plant and other charges. The use of synthetic polymers for adhesives, waterproofing and stiffening would change the face of textiles, particularly in the next few decades, and it might well become difficult to draw a line between the chemical and the textile industry. The two had grown together and overcome all obstacles.

Little Collaboration

Referring to the finishing section of the industry, Mr. Jackson said there had been very little collaboration between finishing—as distinct from bleaching, dyeing and printing—and the chemical industry. No great effort had been made by the chemical industry to alter the properties of fibres. Most developments had come from the finishing section itself. The textile manufacturer was able to modify fibres by mechanical treatment: the finisher had tried to maintain exclusive rights on any interesting development because he did not want other finishers to copy his ideas.

Until 1900, treatment had been more by mechanical than chemical means. Few attempts had been made to modify existing fibre structure. Contributions by the chemical industry had been mostly to auxiliary products: it would appear that the present advance in coloration of textiles had been due to chemical discoveries by chemists, whereas in the finishing section, it had been due to the textile industry.

Looking towards the future, Mr. Jackson said his personal view was that the two industries would become more firmly linked together: the textile industry would become more scientifically minded now that the personnel of both industries could talk the same language. While the textile industry had always been eager to learn of chemical progress, this advance had not been matched by any eagerness to employ chemists in textiles.

I.C.I. to Pay More

THE directors of Imperial Chemicals Industries Ltd. announce that they have decided to recommend a final dividend on the ordinary stock of the company of 6 per cent (less income tax at the United Kingdom standard rate for 1955/56) making with the interim of 4 per cent a total of 10 per cent for the year 1954 (15 per cent for 1953 on the ordinary stock then in issue, equivalent to 7½ per cent on the existing ordinary stock).

The group's consolidated sales for 1954 (which includes £25,000,000 in respect of new subsidiaries now consolidated) reached a record total of £352,000,00 as against £282,000,000 in 1953. The group profit before taxation amounts to £47,684,602 (£36,968,150 for 1953) after charging £16,617,557 for depreciation (£11,551,012 for 1953) and providing £2,652,857 (nil for 1953) for employees' profit sharing bonus. Group profit after taxation is £26,458,372 (19,758,624 for 1953). The meeting will be on 16 June.

'Personal Blend'

AT a press conference held in London last week, The Crookes Laboratories introduced a new cosmetic to be known as Personal Blend Liquid Foundation Cream and which is said to be the result of long research and to be revolutionary in character. The complete article, attractively packaged, consists of a set of three bottles. The first contains a light foundation cream, the second a dark one, and the third is empty. Using the empty bottle, or the palm of her hand, the consumer can obtain the shade of foundation required for either the occasion, her costume or the condition of her skin. A leaflet accompanying each pack contains an introduction to its qualities by Catherine Boyle, the TV star, who was present at the conference.

HOME

Sulphuric Acid Output

Production of sulphuric acid in January amounted to 183,900 tons, the highest figure since March last year. Consumption was also at a high level, at 179,000 tons.

Duke to Visit Aluminium Exhibition

The Duke of Edinburgh is to visit the Aluminium Exhibition (1 to 10 June) at the Royal Festival Hall during the morning of 3 June. His Royal Highness will also lunch with the president and council of the Aluminium Development Association and leading personalities connected with the industry aboard the *Wellington*.

Watching & Saving

Fuel watchers employed during the past ten years in fuel conservation at Fort Dunlop have helped to save 12,550 tons of coal a year despite a big increase in output.

Trade with Eastern Bloc

British chemical exports to China in the first quarter of this year were worth about £750,000. During the quarter about £500,000 worth of chemicals were imported from China and the same amount from Eastern Germany. Trade with the Eastern Bloc generally increased by 40 per cent during the quarter compared with the same period in 1954.

UK Petroleum Statistics

Total UK consumption of petroleum products during 1954 was 21,038,511 tons, an increase of more than 2,000,000 tons over the figure for 1953. Production of refined products during the year was slightly more than 28,000,000 tons, compared with 25,400,000 tons in 1953.

Electronics Course at Harwell

Applications are invited by the Atomic Energy Research Establishment, Harwell, from physicists and electronic engineers holding a degree or equivalent qualification, who wish to attend the tenth specialised course on the design, use and maintenance of electronic instruments used in nuclear physics, radiochemistry, and in work with radioisotopes. The course, to be held at the Isotope School, Harwell, will be from Monday, 23 May, to Thursday, 26 May. Attendance is limited to 12.

MEK Price Reduction

A reduction of £5 per ton in the price of MEK on and after Monday, 2 May, is announced by Shell Chemicals Limited. The new 10-ton drum rate will be £136 per ton, delivered in the United Kingdom.

Explosion at Bakelite Plant

Damage estimated at £100,000 was caused by an explosion and fire at a new synthetic resins plant owned by Bakelite Ltd. near Darlington, recently. Eight men were burned and six of them were detained in hospital. The plant is expected to be out of use for several months, but it is not expected that the 650 employees in the other units will be affected.

Textile Conference

Because of the general election, Sir David Eccles, the Minister of Education, will be unable to inaugurate the Textile Institute's 40th annual conference, which is being held at Caxton Hall, Caxton Street, London S.W.1, from 17 to 20 May. The Mayor of Westminster, Councillor J. Gordon Elsworthy, JP, F.R.I.C.S., will now inaugurate the conference at 3.30 p.m. on Tuesday, 17 May.

Natural Gas Survey

The D'Arcy Exploration Co. Ltd., one of the BP group, which is undertaking on behalf of the Gas Council a five-year search for natural gas throughout Britain, will be starting survey work in the Cheshire basin during the coming summer. The work will consist in the first place of a gravity survey, which measures the minute changes of gravity in the earth's surface and thereby assists in the location of underground structures in which gas may be present. This work is expected to continue for three or four months.

Atomic Energy Exhibition at Thurso

One of the most comprehensive exhibitions dealing with atomic energy yet to be held in the United Kingdom opened at the Town Hall, Thurso, on 23 April. Arranged by the United Kingdom Atomic Energy Authority by arrangement with the Provost and Town Council of Thurso, the exhibition included working models, demonstrations and photographs and charts. It was open until 30 April.

• OVERSEAS •

Indian DDT Factory

Full production capacity of the new state-owned DDT factory in New Delhi, India, is expected to be reached in November, when two tons a day will be produced. The factory, the first in India, started production on 25 March.

Name Changed

The Socony-Vacuum Oil Co. Inc., the New York associates of Vacuum Oil Co. Ltd., changed its name on Monday, 2 May, to Socony Mobil Oil Co. Inc. The firm is retaining the flying red horse as its emblem.

Tenders for US Rubber Plant

Tenders from nine companies have been received for the US Government-owned synthetic rubber plant at Baytown, Texas. This plant was not one of the 24 recently sold to private buyers because the Rubber Facilities Disposal Commission considered the bids were too low.

Research Laboratories for I.C.I.A.N.Z.

Research laboratories are to be built at Melbourne for Imperial Chemical Industries of Australia and New Zealand. It is aimed to make better use of raw materials and pioneer the use of new products and chemicals for agricultural purposes.

Dutch Industry on Show

Output of the Dutch chemical industry doubled in value between 1948 and 1953, and some of its achievements will be shown at the 'E 55' exhibition to be held in Rotterdam from 18 May to 3 September. Aim of the exhibition (E stands for Energy) is to show the progress made in reconstructing the country's economy since the liberation ten years ago.

Canadian Refinery Planned

It is reported that the Supertest Petroleum Corporation Ltd., of London, Ontario, has started studies and surveys with a view to entering the refining field in Canada. W. L. Baragar, president of the Supertest Petroleum Corp. Ltd., has indicated that a refinery might be set up in the Sarnia area.

Germans Build Iran Cement Factory

A cement factory in Iran is to be built by a German firm. Located near the country's capital, it is to achieve a production of 1,000 tons a day by April, 1956.

Plastics Fair Postponed

The World Plastics Fair and Trade Exposition in Los Angeles, California, has been postponed until 5-9 October to give prospective foreign exhibitors more time to arrange for and prepare their displays. The fair was originally due to be held from 6 to 10 April.

Insecticide Plant for Brazil

A new plant which will increase Brazil's output of insecticides is scheduled to be in full operation by 1957. It will also produce industrial solvents, detergents, caustic soda, chlorine and other chemical products. The plant is being built by W. R. Grace Co. of New York, in partnership with the American Home Products Corporation, and a loan of $1,500,000 has been granted by the Export-Import Bank.

Australian Titanium Oxide

Most of Australia's requirements of titanium oxide will be provided by the expansion of a Burnie (Tasmania) processing plant which will raise output from the present 4,000 tons to 8,000 tons a year.

Aluminium-Coated Steel

A new type of aluminium-coated steel is being put into commercial use by a steel firm in Ohio, USA. The product combines the corrosion-resisting and heat-reflecting qualities of aluminium with the strength of steel, and has been used successfully under general atmospheric conditions.

US Firm to Make Phthalonitrile

Barrett Division of Allied Chemical & Dye Corporation, will soon start semi-commercial production of phthalonitrile in the United States. Plant now under construction is scheduled to produce phthalonitrile in substantial development quantities. Phthalonitrile is mainly used as an intermediate for phthalocyanine pigments widely used in inks and paints.

Refinery Film for US TV

Vacuum Oil Company's film 'The Story of Coryton' is to be shown on 200 TV Stations in America. The film—released in this country in January—shows how Britain's newest refinery was built on a flat stretch of Essex marshland in the Thames estuary.

· PERSONAL ·

New vice-presidents of The Institute of Fuel are MR. W. N. C. CLINCH, M.I.Mech.E., M.I.E.E., M.Inst.F., and DR. W. A. MACFARLANE, B.A., B.Sc., Ph.D., F.Inst.F. Mr. Clinch is Divisional Controller of the Eastern Division of the Central Electricity Authority. He has been a member of The Institute of Fuel since 1931. Dr. Macfarlane, who has served on the Institute's Council since 1947, is chief executive of NIFES. Elected members of the Council at the annual general meeting on 27 April were: MR. D. T. BARRITT, B.Sc., M.I.Mech.E., M.Inst.F., MR. E. C. EVANS, B.Sc., F.R.I.C., F.Inst.F., DR. J. G. KING, O.B.E., Ph.D., D.Sc., A.R.T.C., F.R.I.C., F.Inst.F., DR. H. L. RILEY, D.Sc., A.R.C.S., D.I.C., F.R.I.C., F.Inst.F., and SIR ERNEST SMITH, C.B.E., D.Sc., F.R.I.C., F.Inst.F. As already reported (THE CHEMICAL AGE, 1955, **72**, 494), MR. R. H. GUMMER, M.I.Mar.E., M.Amer.I.N.A., F.Inst.F., will take office as president in the autumn, in succession to DR. W. IDRIS JONES, B.Sc., Ph.D., M.I.Chem.E., F.R.I.C., M.I.Min.E., F.Inst.F.

Co-opted to the board in March, MR. J. R. SORSBIE is to become managing director of Gas Purification and Chemical Co. Ltd. on 1 June. MR. P. R. V. WHEELER, present chairman, has stated that the rapid expansion of the company's activities demand the attention of a chairman able to devote the whole of his time to them. He intends to resign at the next annual meeting, retaining his seat on the board, and propose the election of Mr. Sorsbie in his place.

MR. P. A. E. NAYLOR, production director of the Paints Division of Imperial Chemical Industries Ltd., retired on 30 April after 36 years' service with the company and its predecessors. Mr. Naylor was educated at Aldenham School and Pembroke College, Cambridge, where his studies were interrupted by the first World War. In January 1919 he joined Naylor Brothers Ltd. and on the acquisition of that company by Nobel Chemical Finishes Ltd. was appointed assistant works manager at Slough. Later he became responsible for work study in the Paints Division. During the second World War he was seconded to the Ministry of Supply. Appointed production manager of Paints Division in 1945, he became division production director in 1949.

MR. G. W. LAKE, B.Sc., M.Inst.F., has been appointed production director of British Oxygen Gases, Ltd., the new subsidiary company of the British Oxygen Company, which is to conduct all trading operations in industrial and medical gases and equipment, as from 1 October (see p. 1055). These operations are currently the responsibility of the parent company. Mr. Lake was born in Ebbw Vale, Monmouthshire, and educated at Newcastle - under - Lyme High School, and St. Bede School, Cumberland. Shortly after leaving school he joined W. C. Holmes, gas and by-product engineers, and later became principal assistant to the technical manager. During one period he was chief engineer to the Shelton Iron & Steel Co. He joined the British Oxygen Company in 1951 as personal assistant to the managing director on the production and engineering side. Since 1953 he has been chief technical executive.

G. W. Lake

The wedding took place at Undercliffe Methodist Chuch, Bradford, on 30 April of DR. GEOFFREY LONG, B.Sc., Ph.D., only son of Mr. and Mrs. Frank Long, of Undercliffe, and MISS MARGARET JEAN FOSTER, B.A., only daughter of Mrs. and the late Mr. Fred Foster, of Fagley. The bridegroom is a Government research chemist.

Appointment of two new assistant vice-presidents of Shawinigan Chemicals Ltd. has been announced. They are MR. A. H. ANDERSON, Shawinigan Chemicals' technical director in the Montreal head office for the past 18 months, and MR. GWYN BENSON, who for the past three years has been the company's European representative, with headquarters in London.

MR. JOHN DEREK PAGE, aged 27, industrial chemist, of Mill Lane, Heatley, Lymm, is the prospective Labour candidate for Northwich in the general election.

The appointment is announced as from 1 June, of MR. JOHN L. FLETCHER as commercial manager of Styrene Co-Polymers Ltd., in which position he will be responsible for all commercial activities of the company. MR. A. W. R. THOMAS, who has been a member of the sales organisation since 1952, has been appointed sales manager in place of MR. D. J. I. DAVIES, who has resigned from the company.

The following retiring directors were re-elected by shareholders at the annual meeting of The International Nickel Company of Canada Ltd., held on 27 April: EDWIN G. BAKER, LEWIS W. DOUGLAS, J. ROY GORDON, H. R. MACMILLAN, C.B.E., VISCOUNT MARGESSON, P.C., M.C., R. SAMUEL MCLAUGHLIN, H. C. F. MOCKRIDGE, Q.C., THEODORE G. MONTAGUE, R. L. PRAIN, O.B.E., GEORGE C. SHARP, JOHN F. THOMPSON (chairman), and VISCOUNT WEIR, P.C., G.C.B.

LORAN S. O'BANNON has been named technical adviser at Battelle Institute, Columbus, Ohio. As a member of the staff of the Office of the Director, he will provide liaison between the Institute and its clients in industry. A veteran of 20 years' experience in research, Mr. O'Bannon has been engaged in ceramic research at Battelle since 1942, prior to which he was a research engineer with the Ferro Enamel Corporation of Cleveland, Ohio, for six years.

MR. H. R. BLACK has been appointed technical sales representative of Spencer, Heath & George Ltd. for whom, in furtherance of their expansion policy, a new factory has recently been completed at Enfield. Mr. Black has joined the company to deal principally with the furnishing of laboratories in London and the Home Counties.

The following are among foreign members elected at a meeting of the Royal Society on 28 April: WERNER HEISENBERG (Göttingen), distinguished for his basic contributions to quantum theory, and LISE MEITNER (Stockholm), distinguished for her fundamental discoveries in radioactivity and nuclear physics.

Under the auspices of the Franco-British Pharmaceutical Commission, MR. F. H. OLIVER, head of the Department of Pharmacy in Sunderland Technical College, and MR. F. C. WILSON, secretary of Surrey Pharmaceutical Committee, are completing a lecture tour in France this week, visiting Rheims, Nancy, Besançon and Grenoble. Mr. Wilson's subject is the pharmaceutical organisations of this country and Mr. Oliver is reading a paper on the rôle of the endrocine organs in the regulation of carbohydrate metabolism.

Tube Investments Ltd. announces the following senior appointments to the Tube Investments Research Laboratories, Hinxton Hall, Cambridge: F. P. BOWDEN, Sc.D., F.R.S., of the University of Cambridge—chief research consultant and in charge of the laboratories; *Research Scientists*, A. CHARLESBY, D.Sc., Ph.D. (formerly with the Atomic Energy Research Establishment, Harwell); J. E. GORDON, B.Sc. (formerly with the Royal Aircraft Establishment, Farnborough); A. P. GREEN, M.A. (formerly with the British Iron & Steel Research Association); R. J. W. MCLAUGHLIN, M.Sc., Ph.D. (at present at the Department of Mineralogy and Petrology, University of Cambridge); J. W. MENTER, M.A., Ph.D. (formerly with the Research Laboratory of the Physics and Chemistry of Surfaces, Department of Physical Chemistry, University of Cambridge); D. W. PASLEY, B.Sc., Ph.D. (at present at the Department of Physics, Imperial College, University of London); G. W. ROWE, M.A., Ph.D. (formerly with the Research Laboratory of the Physics and Chemistry of Surfaces, Department of Physical Chemistry, University of Cambridge); R. WORRALL, B.Sc. (at present at the Department of Chemistry, University of Birmingham). The laboratories are undertaking fundamental research in physics, chemistry, metallurgy, engineering and electronics, and related sciences.

Having accepted a Colonial Office appointment in Hong Kong, A. J. NUTTEN, B.Sc., Ph.D., A.R.I.C., of the Department of Chemistry, University of Birmingham, is leaving the United Kingdom on 27 May. After that date his friends can contact him c/o The Director of Medical Services, Hong Kong. Dr. Nutten is well known in analytical circles and was a founder member of the Midlands Analytical Methods Discussion Group.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

STEWART PLASTICS LTD., London W.—22 March, mortgage and charge, to National Provincial Bank Ltd. securing all moneys due or to become due to the bank; charged on leasehold Canford Works, Waddon Marsh Way, Croydon, with plant, fixtures, etc., and a general charge (subject to, etc.). £12,500. 23 December, 1954.

Satisfaction

BRITISH CELANESE LTD., London W.—Satisfaction 29 March, of Trust Deed registered 2 October, 1943, and supplemental deed registered 8 November, 1944, to the extent of £8,990.

Increases in Capital

The following increases in capital have been announced: A. L. SLIM LTD., from £250 to £750; DUSSEX BROTHERS & CO., LTD., from £170,000 to £315,000.

New Registrations

Byefly (Pest-Bands) Company Ltd.

Private company. (547,741). Capital £500. Manufacturers of and dealers in insecticides, herbicides, fungicides, etc. Directors: Josiah S. B. Sparrow and Edward C. Ferguson. Reg. office: 2 Drayton Court Chambers, Argyle Road, Ealing W.13.

Ironchem Ltd.

Private company (547,970). Capital £100. Exporters, importers, manufacturers, merchants and agents for iron and metal goods; chemicals and chemical compounds, etc. Directors: Frank B. Lockwood and Mrs. Christine A. Lockwood. Reg. office: 25 Wellington Court, Knightsbridge, S.W.1.

N. & D. Wilson Ltd.

Private company. (547,930.) Capital £100. Manufacturers of and dealers in bleaches, disinfectants, detergents, solvents, cleaning powders, etc. Directors: Norman Wilson and Mrs. Myrna Wilson. Reg. office: 1 Broadfields Parade, Glengall Road, Edgware, Mdx.

Liga (Ireland) Ltd.

Private company. (15,567.) Registered in Dublin. Capital £10,000. To manufacture dietetic foods, chemical and pharmaceutical products, etc. Thomas R. Neurlrlings is governing director.

Company News

Colliery Engineering of Sheffield

Head, Wrightson and Co. Ltd. has acquired from the British Metal Corporation the entire share capital of Colliery Engineering of Sheffield and its subsidiary, Cupola Mining and Milling. Head, Wrightson intends to develop both businesses in co-operation with its own organisation.

British Drug Houses Ltd.

Group net profit, after tax, of British Drug Houses Ltd. for 1954 was £216,532, compared with £124,695 for 1953. A dividend of 15 per cent, plus a bonus of 2½ per cent, is recommended for the year, against 12½ per cent previously.

Bowaters Paper Corporation Ltd.

Improved earnings were reported for Bowaters Paper Corporation Ltd. for the 15 months ending on 31 December, 1954. Consolidated profit was £13,090,000, compared with £8,180,000 in the previous year, the greater part of the earnings coming from overseas interests. A final dividend of 15 per cent is recommended, making 22½ per cent for the 15 months on capital doubled to £7,200,000. This is the equivalent of 18 per cent per annum and compares with 16 per cent for the previous year on the smaller capital.

United Molasses Company Ltd.

The board of the United Molasses Co. Ltd. recommends a final ordinary dividend of 9½d. per 10s. unit, free of tax, making the equivalent of 22.10 per cent gross, against 21.97 per cent for 1953. In addition, a special cash distribution, not subject to tax, of 4 per cent, payable out of capital reserve, is to be made. This is the same as for 1953. Group net profits, after tax and depreciation, were £1,319,427 (£1,277,873).

F. W. Berk & Co. Ltd.

Sales of F. W. Berk & Co. Ltd. have expanded by over 30 per cent, says the chairman, Mr. A. D. Berk, in his annual statement. Markets remain very competitive, but margins have been maintained. The improvement is evenly spread over both manufacturing and merchanting operations. The greater turnover has more than offset the steadily increasing costs both in labour and services, but further substantial increases in rates of pay have already been granted during the current year, and it becomes more and more difficult to recover such additional costs by greater efficiency. Continued expanson of fine chemical operations carried on at Sanderstead, Surrey, have resulted in the overflow arrangements made at Park Royal proving inadequate. Negotiations are being carried on for the acquisition of a further factory at Sandridge, Hertfordshire. Office accommodation is also proving inadequate, and it is hoped to obtain new premises in Portman Square. A total payment of 20 per cent for the year is proposed.

Cooper, McDougall & Robertson Ltd.

Net profit, after tax, etc., of Cooper, McDougall & Robertson Ltd. was £288,071 in 1954, against £127,550. Sir William H. Cooper, chairman, says the improvement in trading was largely due to special export orders which may or may not be repeated and to a sound improvement in normal trade in almost every group unit.

British Enka Ltd.

British Enka Ltd. is repeating its 10 per cent dividend on the £1,875,000 equity for 1954. Group working profit after provision for loss by subsidiary not consolidated is £929,943, against £1,033,426.

Canadian Industries (1954) Ltd.

Net income for Canadian Industries (1954) Ltd., for the six months ended 31 December, 1954, was $2,041,192, while sales for the period totalled $45,600,000. The report covers the period since 1 July, 1954, following the physical division of Canadian Industries Ltd. Because of the changed corporate structure and scope of operations, the report does not include comparisons with earnings of the operating units taken over from Canadian Industries Ltd. At the end of the year, Canadian Industries (1954) Ltd. owned 21 plants and the number of employees stood at 6,500. Factors noted as affecting net income included the loss of caustic soda and chlorine output formerly available from the Windsor plant which was closed following the ground subsidence early in the year; limited production at the new polythene plant in Edmonton; and expenses incurred in preparation for the manufacture and distribution of Terylene polyester fibre.

Unilever Ltd.

Combined turnover of the Unilever Group in 1954 rose to £1,437,429,000—£217,308,000 more than in 1953 and a new peak. This is equal to £45 worth of trading for every second throughout the year. The Unilever review of operations (which was published on Tuesday) states that the outstanding feature of the oils and fats market in 1954 was the return to private trading in both the UK and the Netherlands. World consumption of oils and fats increased in 1954, and this helped the US Government to dispose of its stock of cottonseed oil, which declined from 466,000 tons at the beginning of the year to 136,000 tons at the end. In 1955, for the first time since the beginning of the war, the world oils and fats markets will no longer be dominated by large Government-held stocks (with the exception of the US Government holdings of butter).

Copper Sulphate Duty Free Quota

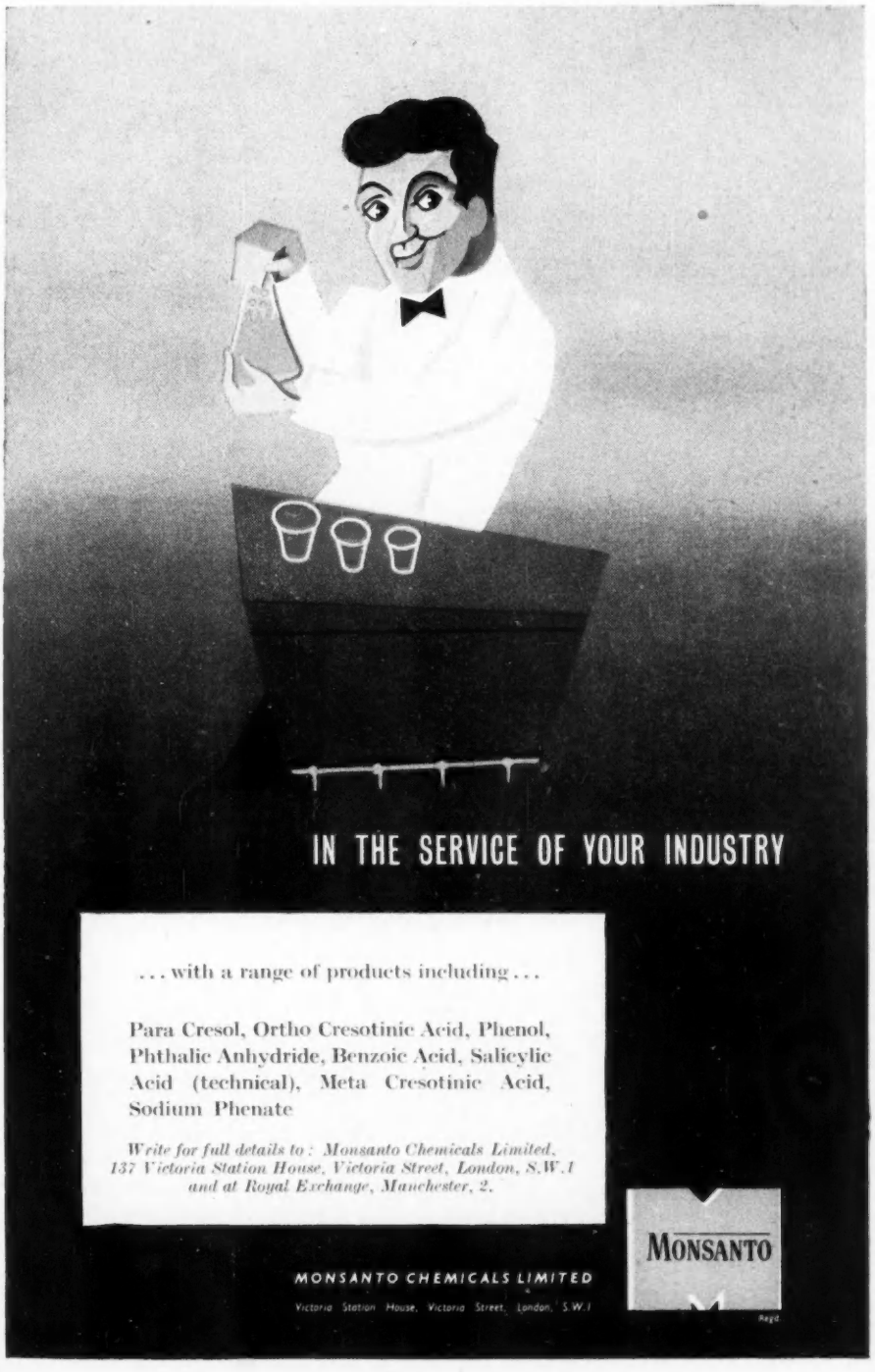
The French *Journel Officiel* has announced that the duty-free quota for copper sulphate imported into France during the period ending 30 June has been increased from 4,000 tons to 6,000 tons. The French text of the notice may be seen at the Exports Services Branch, Board of Trade, Room 625, Lacon House, Theobalds Road, London W.C.1. Copper sulphate imported under the duty-free quota is exonerated from the special temporary compensation tax of 10 per cent imposed on 11 January.

US By-Product Sulphuric Acid

Production of by-product sulphuric acid at US copper and zinc plants in 1954 was 886,000 short tons, compared with 868,000 in 1953. The acid is only that produced from the sulphur content of the sulphide ores.

More Canadian Paints

Canadian production of paints and varnishes topped the $100,000,000 mark for the first time in 1953.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Next Week's Events

MONDAY 9 MAY

Chemical Society

Galway: Chemistry Department, University College, 7.45 p.m. 'The Fundamental Principles of Catalysts' by Professor H. C. de Boer (joint meeting with the Institute of Chemistry of Ireland, RIC and SCI).

TUESDAY 10 MAY

Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. Annual general meeting, followed by 'Automatic Control for Dial Weighing Machines' by R. A. Lolley and J. H. L. McAuslan.

WEDNESDAY 11 MAY

SCI (Corrosion Group)

London: G. A. Harvey & Co. Ltd., Greenwich Metalworks, S.E.7, 2.30 p.m. Works visit.

SCI (Food Group)

London: Rooms of the Chemical Society, Burlington House, Piccadilly, 6.30 p.m. Annual general meeting, followed by chairman's address by Dr. J. H. Bushill: 'Wartime Food Processing Problems in Retrospect'.

Institution of Chemical Engineers

Birmingham: J. E. Sturge & Co., Lifford Works, 2 p.m. Works visit (Graduates' and Students' Section).

THURSDAY 12 MAY

Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. Film on the research activities of the Instituto Superiore di Sanita, Rome, with an address by the Director-General, Professor D. Marotta, followed by 'Some Recent Advances in Carbohydrate Metabolism' by Professor E. B. Chain.

SCI (Microbiology Group)

London: 183 Euston Road, N.W.1, 10 a.m. Visit to Wellcome Building and Wellcome Research Laboratories, Beckenham, Kent.

FRIDAY 13 MAY

Royal Institution

London: 21 Albemarle Street, W.1, 9 p.m. 'The No-Man's Land between Conductors and Insulators' by R. W. Douglas.

Chemical Society

Newcastle-on-Tyne: Chemistry Building, King's College, 5.30 p.m. 'Chemical Effects of Steric Strains' by Professor H. C. Brown.

Society for Analytical Chemistry

London: Lecture Hall, Royal Society for Tropical Medicine and Hygiene, 26 Portland Place, W.1, 2.30 p.m. Biological Methods Group meeting on 'Biological and Microbiological Methods of Estimating Vitamin B_{12}.'

Market Reports

LONDON.—Buying interest in most sections of the industrial chemicals market has been on steady lines during the past week, with the home trade movement against contracts covering good volumes. Overseas inquiry has been good. Prices generally are unchanged, with a firm undertone. A good demand on home and export account with quotations for most items steady is the position reported on the coal tar products market.

MANCHESTER.—There has been a fair number of fresh inquiries on the Manchester chemical market during the past week and replacement buying in the alkalis and other bread-and-butter lines has been on a satisfactory scale. The textile industries and other leading industrial consumers are also calling for steady deliveries under contracts. Prices generally continue on a firm basis. The improvement in the demand for fertiliser materials, including the compounds and superphosphates, has been maintained, and a steady business is passing in most of the light and heavy tar products.

GLASGOW.—Business in the Scottish market during the past week for industrial chemicals has, if anything, been a little quieter. Orders received have been nominal and mostly against immediate requirements. On the other hand, it has to be reported that in agricultural chemicals the demand is still good with a fair volume of business being booked. Numerous inquiries are still being received for the export market which is still very active.

British Drug Prices Among Lowest

British drug prices are among the lowest in Europe. Professor D. M. Dunlop, Professor of Therapeutics at Edinburgh University, said at the opening of an exhibition for the medical and associated professions in Edinburgh on 25 April. The pharmaceutical price index, he said, was only 3 per cent above that for 1949.

PERMUTIT

ION EXCHANGE MATERIALS

Ion Exchange today performs many tasks in industry, and Permutit manufactures a wide range of these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes giving improved results and lower running costs. Some of the materials now available, with their characteristics, are shown below.

ZEO-KARB Na A sulphonated coal product containing both strong and weak acid groups.

ZEO-KARB 215 A nuclear sulphonated phenol resin containing also hydroxyl groups.

ZEO-KARB 225 A unifunctional cross linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.

ZEO-KARB 226 A unifunctional cross linked methacrylic acid resin in bead form containing only carboxyl groups as the ion active groups.

DE-ACIDITE E A high capacity anion exchange material of medium basicity.

DE-ACIDITE FF A unifunctional very highly basic anion exchange resin in bead form based on cross linked polystyrene and containing quaternary ammonium groups.

DE-ACIDITE G A unifunctional weakly basic exchange resin in bead form based on cross linked polystyrene and containing diethylamino groups.

DE-ACIDITE H A material similar to "De-Acidite G" but containing dimethylamino groups.

BIO-DEMINROLIT A mixed cation and anion exchange resin for demineralisation in a single column.

DECALSO F A synthetic sodium aluminium silicate suitable for the separation and concentration of vitamins and hormones.

DECOLORITE A resin of high porosity for removing colour from solutions.

PERMAPLEX C-10 A highly selective cation exchange resin membrane containing SO_3H groups.

PERMAPLEX A-10 A highly selective anion exchange resin membrane containing quaternary ammonium groups.

For full technical information please write to:—

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CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS

EXAMINATIONS 1955

THE present Examination will be held for the last time in 1955.

Particulars of this and the new Examination, together with application forms which are returnable by the 1st June, 1955, may be obtained from: The General Secretary, **THE INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, LONDON, S.W.1.**

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

BRITISH TITAN PRODUCTS COMPANY LIMITED

has vacancies in its Research Department at Billingham, for male

GRADUATE CHEMISTS,

preferably qualified and experienced in Physical and/or Inorganic Research work.

One of these vacancies is for a Graduate experienced in Analytical Chemistry. Applicants must be British subjects.

Conditions of work and service are very attractive and there is a Contributory Superannuation Scheme, and Staff Bonus Scheme, as well as a non-contributory Life Assurance Scheme. Assistance with housing and removal expenses will be considered where necessary. Commencing salary dependent on age, qualifications and experience.

Application forms may be obtained from the

PERSONNEL MANAGER,
BRITISH TITAN PRODUCTS COMPANY LIMITED
COPPERGATE, YORK,
quoting reference S.9.F.

CHEMIST or **CHEMICAL ENGINEER** with experience in the manufacture of synthetic adhesives, required to design and operate a plant for the manufacture of urea-formaldehyde and P.V.A. emulsions. This is a senior appointment and the remuneration will be in keeping with the degree of responsibility involved. Applications should be sent to **BOX 3315, ROBERTSON & SCOTT, 42, CHARLOTTE SQUARE, EDINBURGH, 2.**

MINISTRY OF FUEL AND POWER require **PRINCIPAL SCIENTIFIC OFFICERS** £1,155-£1,535 (male) or **SENIOR SCIENTIFIC OFFICERS** £990-£1,155 (male) at S.M.R.E., Sheffield, for research in air pollution. Qualifications: 1st or 2nd cl. Hons. Degree Physics or Chemistry, 3 years post graduate research. Specialist knowledge in any of the following an advantage: physics of aerosols, meteorology, electron or optical microscopy, instrument design, microchemistry, chromatography, coal or tar chemistry. Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A 142/5A.

EXPERIENCED DRAUGHTSMAN with knowledge of Chemical Plant required. The work will include design and details of Gas Scrubbing and Stripping equipment together with allied pipework, ducting, tanks, platforms, etc. Good prospects and salary in an expanding department are available to a capable man. Write giving full details to **MR. J. M. COOPER, PEABODY LTD., 300, VAUXHALL BRIDGE ROAD, LONDON, S.W.1.**

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
ALDERMASTON,
BERKS,
requires
CHEMISTS
in the grades of
EXPERIMENTAL OFFICER
and
ASSISTANT EXPERIMENTAL OFFICER
for the following duties:

(*a*) Organic Chemist, to carry out general preparative work in research laboratories;
(*b*) and (*c*) Chemists or Chemical Engineers to assist in research and development on the production of organic materials on a pilot plant scale.
(*d*) Organic Chemist for process development up to pilot plant scale.

The minimum qualification for all posts is Higher School Certificate (Science) or equivalent, but for Experimental Officer posts a pass degree is desirable. For post (*a*) experience of organic synthesis is required; for posts (*b*) and (*c*) plant experience is desirable; for post (*d*) experience in process development would be an advantage.

SALARY.—
Experimental Officer (minimum age 26), £775 to £945 per annum (male).
Assistant Experimental Officer, £310 (age 18) to £685 per annum (male).

The successful applicants will be required to join the Authority's Contributory Superannuation Scheme.

Housing accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishment's transport facilities or alternatively, the Authority may be able to assist successful candidates in the purchase of a house. During this period lodging allowance may be payable.

Send post-card for application form to:
SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote reference 631/WGE./38.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requires an **ANALYTICAL CHEMIST** in the grade of **EXPERIMENTAL OFFICER** for research and development work in an analytical laboratory. The minimum qualification is Higher School Certificate (Science) or equivalent but a pass degree in Chemistry is desirable. Several years experience in a research or inspection laboratory and a sound knowledge of basic analytical methods are essential. Experience in explosives testing would be an asset.

Salary: £775 (minimum age 26)-£945 p.a. (male).

The successful applicant will be required to join the Authority's Contributory Superannuation Scheme. Housing accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishments transport facilities or alternatively the Authority may be able to assist successul candidates in the purchase of a house. During this period a lodging allowance may be payable.

Application forms on request by POST CARD to Senior Recruitment Officer, AWRE, Aldermaston, Berks, quoting reference 629/WGE/38.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
ALDERMASTON,
BERKS,
requires
PHYSICISTS, PHYSICAL CHEMIST,
or
MATHEMATICIANS
in the grade of
EXPERIMENTAL OFFICER
or
ASSISTANT EXPERIMENTAL OFFICER
for the following duties :

(*a*) Physicist or Physical Chemist to assist in the measurement of power and sensitiveness of explosives.
(*b*) Physicist to assist in research work of a spectroscopic group.
(*c*) Physicist or Mathematician to carry out computation work in the evaluation of explosive properties of new explosives and to assist in the measurement of these properties.

The minimum qualification for these posts is Higher School Certificate (Science) or equivalent but for Experimental Officer posts a pass degree is desirable. For post (*a*) a knowledge of elementary statistics is desirable ; for post (*b*) some experience of emission or absorption spectroscopy would be an advantage.

SALARY.—
Experimental Officer, £775 (minimum age 26) to £945 per annum (male).
Assistant Experimental Officer, £310 (age 18) to £685 per annum (male).

The successful applicants will be required to join the Authority's Contributory Superannuation Scheme.

Housing accommodation will be available within a reasonable period for married officers who live outside the radius of the Establishment's transport facilities or alternatively, the Authority may be able to assist successful candidates in the purchase of a house. During this period a lodging allowance may be payable.

Requests for application forms by **post-card** to :
SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote reference 632/WGE./38.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
ALDERMASTON,
BERKS,
requires
PHYSICAL CHEMISTS
in the grade of
EXPERIMENTAL OFFICERS
or
ASSISTANT EXPERIMENTAL OFFICERS,
to assist in groups engaged in :

(*a*) The production of experimental high explosive charges or
(*b*) the production and filling of initiatory explosives, and to undertake development work in these fields.

The minimum qualification is Higher School Certificate (Science) or equivalent, although for Experimental Officer a pass degree is desirable. For post (*a*) experience of plant work would be an advantage.

SALARY.—
Experimental Officer, £775 (minimum age 26) to £945 per annum (male).
Assistant Experimental Officer, £310 (age 18) to £685 per annum (male).

The successful applicants will be required to join the Authority's Contributory Superannuation Scheme.

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Requests for application forms by **post-card** to :
SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote reference 633/WGE./38.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
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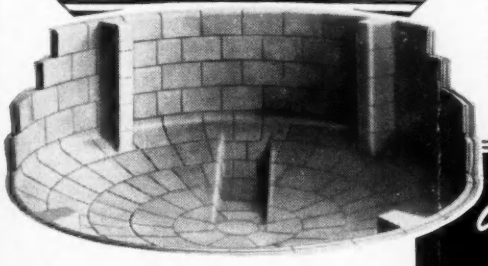

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